ATLAS
OF
ORTHOPEDIC PATHOLOGY

FROM MATERIAL IN
THE REGISTRY OF ORTHOPEDIC PATHOLOGY

SPONSORED BY
THE AMERICAN ACADEMY OF ORTHOPEDIC SURGEONS
AND
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ORTHOPEDIC PATHOLOGY

This set of slides has been compiled to illustrate the more common lesions of bones, muscles, tendons, joints and related structures

The plan has been, in so far as possible, to include typical examples of various diseases Duplicate cases have been included in a few instances to illustrate different features of similar pathologic processes Although obscure and questionable cases have been purposely omitted, a few atypical cases have been included to illustrate some of the problems of differential diagnosis

In each case the essential data from the clinical history, an X-ray if available, as well as a photomicrograph, have been included A sufficient number of roentgenograms have been included so that in most instances it is possible to correlate the pathologic anatomy with the X-ray

One or more specific references are given in most instances They have been carefully selected to include comprehensive articles It is suggested that the attached bibliography be used for collateral reading

This Atlas was prepared to provide a convenient opportunity for review of the essential pathology of orthopedics for those who may not be able to study the slide sets It is meant not only for those preparing for the Board examinations, but for the practitioner as such, but not as an entirely satisfactory substitute for the study of gross specimens and the slide set, especially if this is possible under the guidance of a pathologist It may be difficult for the clinician to develop an interest in the basic sciences of his specialty, but the effort expended on them, and particularly on pathology, will be found very much worthwhile There is no question that the insistence of the special boards on a knowledge of pathology of the respective specialties has been a big factor in raising the professional standards in this country

It is hoped that the Atlas will stimulate an interest in the Registry of Orthopedic Pathology sponsored by the Academy at the Army Medical Museum and that the surgeons will register their cases so that eventually important definitive studies will be possible

SUGGESTED COLLATERAL READING:

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9 Kaufmann, Eduard Pathology for Students and Practitioners Philadelphia, P Blakston's Son & Co , 1929 Vol 2

10 Kling, D H. The Synovial Membrane and the Synovial Fluid Los Angeles, Medical Pr , 1938

11 Fisher, A G T Internal Derangements of the Knee-Joint 2d Ed London, H K. Lewis & Co , 1933

12 Bennett, G A , Waine, Hans & Bauer, Walter Changes in the Knee Joint at Various Ages. New York, Commonwealth Fund, 1942

13 Allison, Nathaniel & Ghormley, R K Diagnosis in Joint Disease New York, W Wood & Co , 1931

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15 Ewing, James Neoplastic Diseases 4th Ed Philadelphia, W B Saunders Co , 1940

16 Geschickter, C F & Copeland, M M. Tumors of Bone Rev Ed New York, The American Journal of Cancer, 1936

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EMBRYOLOGY AND ORGANOGENESIS OF THE SKELETAL SYSTEM

After gastrulation and formation of the mesoderm the three germ layers of the embryo begin to differentiate and produce the anlage or primordia of the most important organic systems

Differentiation of Mesoderm: The mammalian mesoderm grows rapidly between the ecto- and endoderm. At first it is a single sheet but soon splits into two layers, one associated with the ectoderm (somatic mesoderm) and the other with the endoderm (splanchnic mesoderm)

Connective tissue, cartilage, and bone all differentiate from diffuse mesoderm known as mesenchyme It is a spongy meshwork composed of branching cells between which are spaces filled with coagulable fluid

The mesenchymal cells become fibroblasts, flattened, irregularly branched cells with large nuclei They are non-phagocytic The characteristic connective tissue fibers arise in the intercellular spaces rather than within the fibroblasts as formerly supposed

The argyrophil fibers are the first to appear and remain as such in the reticulum of certain organs (esp spleen, liver and lymph nodes)

Development of the Skeleton

The mesoderm is considerably thicker at the junction of somatic and splanchnic layers than elsewhere This thicker dorsal and median mesoderm becomes divided transversely into a number of more or less cuboidal, usually solid masses, the somites

The segmentation of the dorsal mesoderm proceeds caudad until 38 pairs have developed in the neck and trunk regions of the body

Each somite becomes differentiated into 3 distinct portions: the sclerotome, myotome and dermatome

1 Sclerotome: The cells of the somite adjacent to the notochord grow inward toward the midline to surround the notochord and lateral walls of the neural tube They will form the body of the vertebrae and the vertebral arches

2 Myotome: The middle portion of the somite will give rise to a part of the skeletal (voluntary) musculature of the body

3 Dermatome: The outer or lateral part of the somite is probably transformed into the derma of the skin.

The skeleton is composed of two distinct parts: the axial and appendicular

The AXIAL skeleton is comprised of the vertebral column, ribs, sternum and skull

The vertebral column and ribs originate from the sclerotomes of the somites

The ribs arise from the costal processes of the vertebrae, the site of their original union with the vertebra is replaced by a joint which receives the head of the rib The transverse process of the vertebra extends outward and articulates with the growing tubercle of the rib There is a single center of ossification for each rib

The sternum arises from paired sternal bars which unite the upper eight or nine cartilaginous thoracic ribs of each side The two bars fuse together at an early period and then ossification takes place

Most of the bones of the skull arise from the chondrocranium, a mass of cartilage extending from the occipital to the ethmoidal region The *flat bones of the vault and face are purely membranous*

The APPENDICULAR skeleton is derived from the somatic mesenchyme which forms the core of the limb bud and becomes converted into cartilage Ossification of this cartilage produces all the bones of the limbs with the possible exception of the clavicle

Development of the Limbs: At the 5th week the limbs are merely lateral swellings The upper limb buds arise first

The distal end of the limb bud flattens and a constriction separates it from the proximal cylindrical segment The flattened part becomes the hand or the foot respectively The digits are indicated by radial ridges

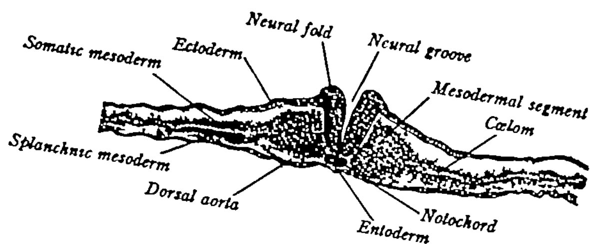
A second constriction separates the proximal region into two segments, the arm and forearm and the thigh and leg respectively

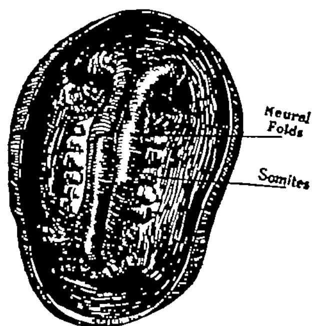
The limbs undergo changes in position during development At first they point caudad but soon project at right angles to the body wall Later the palmar and plantar surfaces face the body Further rotation brings them into the position of the adult

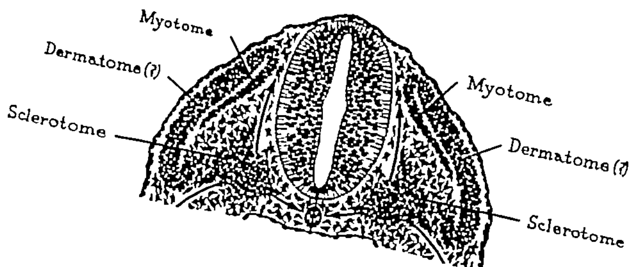
Anomalies are frequent and range from complete or almost complete absence of the limbs (amelus) to a partial duplication of the hand or foot (dichirus)

Development of Joints: The joint cavity arises in the fourth month from clefts in the loose mesenchyme, located between the prospective bones; the capsule is derived from the denser external tissue continuous with the periosteum. The cells on the inner surface of joint cavity flatten into a false epithelium called the synovial membrane A joint cavity may be divided by an articular disc which is merely a fibro-cartilaginous plate Ligaments or tendons that apparently pass through the adult joint cavities actually represent secondary invasions They are covered with synovial membrane and hence are really external to the cavity

Collagen *fibers arise through chemical transformation of argyrophil fibers* They appear as bundles of fine fibrils held together by a cement substance They vary in size and anastamose freely They yield gelatin when boiled in water


Neural fold
Somatic mesoderm
Ectoderm
Neural groove
Mesodermal segment
Cœlom
Splanchnic mesoderm
Dorsal aorta
Notochord
Entoderm


Neural
Folds
Somites


Myotome
Dermatome (?)
Sclerotome
Myotome
Dermatome (?)
Sclerotome

Elastic fibers are homogeneous branched fibers anastomosed into a loose network They are highly refractive and thinner than collagen fibers Little is known of their development; they are laid down among the collagen fibrils

These fibers are enclosed or contained in a ground substance that is believed to be a system of thin membranes delimiting irregular spaces filled with fluid

Most of the structures concerned with the support of the body are composed of fibroblasts, collagen or elastic fibers in varying proportions The intercellular spaces are not conspicuous

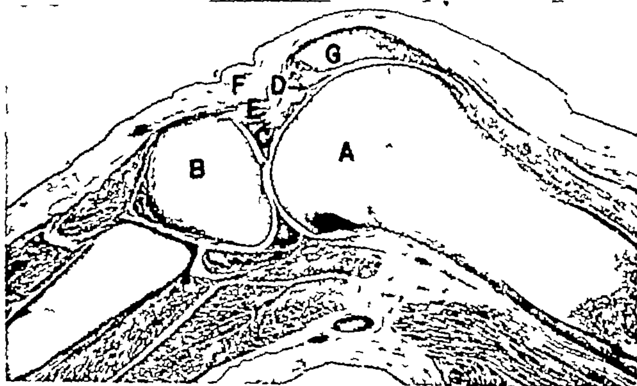
Tendons, ligaments, aponeuroses and fasciae are composed largely of collagen and for this reason are white in color

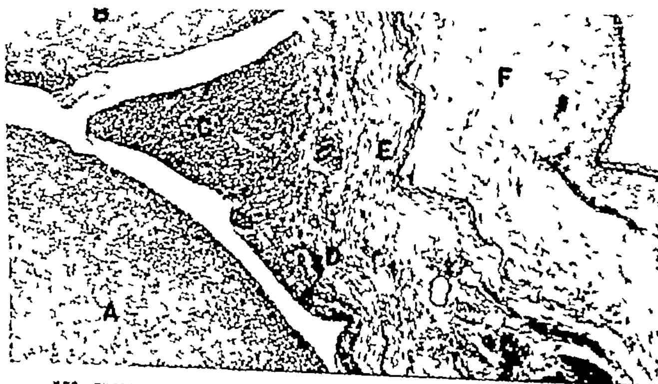
a) In tendons and ligaments the collagen bundles are thick, closely placed and parallel Fibroblasts appear as rows between the bundles and are very much compressed There is a less regular arrangement in the ligaments

b) In aponeuroses and fasciae the bundles are woven into a very compact meshwork containing elastic fibers

The ligamenta flava of the vertebrae and the ligamentum nuchae are composed largely of elastic fibers and are yellow in color The fibers are arranged in parallel strands with frequent anastomoses

KNEE JOINT OF NORMAL 3 MONTHS FETUS ACC 98612





NEG 74093 X 20

NEG 74091 X 100

A Femur
B Tibia
C Semilunar cartilage
D Synovia
E Joint capsule
F Fascia
G Patella

CARTILAGE

Cartilage is a specialized form of connective tissue composed of a firm resilient matrix and cells called chondroblasts There are three kinds of cartilage (1) Hyaline (2) Fibro-cartilage (3) Elastic cartilage

HYALINE CARTILAGE

Hyaline cartilage provides the basis for the ossification of the greater part of the skeleton It is freely sprinkled with cells (A) which are usually scattered fairly uniformly throughout the matrix (B) Except over articular surfaces, hyaline cartilage is enclosed in a connective tissue sheath, the perichondrium. In the matrix the cells are commonly arranged in discrete groups of 2, 3 or 4 which have arisen from the division of a single chondroblast Each group is enclosed in a capsule of more recently deposited matrix (C) which shows up by its deeper staining

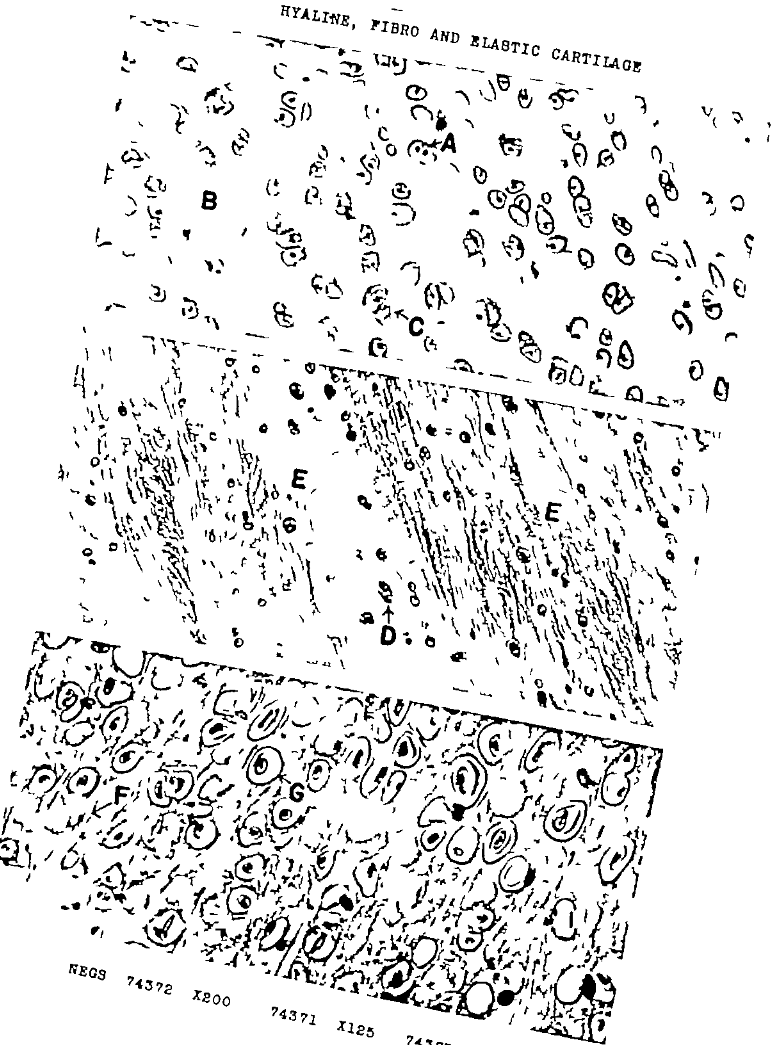
The matrix of hyaline cartilage consists of a translucent substance which is particularly resistant to pressure forces and also possesses considerable elasticity Embedded in it is an extremely fine meshwork of collagenous fibrils The mesenchymal cells (chondrocytes) retract their processes and become more rounded, while an intracellular matrix of clear mucinoid fluid is deposited between them This transitional stage is termed *precartilage*. Around each individual cell, now termed a chondroblast, true cartilage is deposited as a thin film of basophilic hyaline substance The tissue thus takes on a honeycomb appearance that rapidly changes to more mature cartilage by a thickening of the intracellular septa In the adult new cartilage may be formed in the same manner by a metaplasia of connective tissue cells Structures normally composed of hyaline cartilage have a tendency to calcify and ossify in old age For example, the laryngeal and costal cartilages usually show a partial conversion into bone in later life, commencing with the deposition of calcified plaques on the surface

FIBRO-CARTILAGE

Fibro-cartilage consists of islands of cartilage cells (D) scattered through dense white fibrous tissue (E) This is a transitional type of cartilage and may in some instances resemble hyaline cartilage and in others have the appearance of fibrous tissue Fibro-cartilage is found in diarthrodial joints between membranous bone It is also a usual component of tendons where they are exposed to frictional pressure or where they are inserted into bone

ELASTIC CARTILAGE

The matrix is permeated with a network of elastic fibers (F) which provide the tissue with considerable resilience The cartilage cells are surrounded by an unusually dense capsule (G) In man it is found only in a few isolated regions; for example, the external ear and the epiglottis It normally shows no tendency to calcify or ossify with advanced age


HYALINE, FIBRO AND ELASTIC CARTILAGE
A
B
C
D
E
E
F
G
NEGS 74372 X200 74371 X125 74373 X205

BONE

A long bone is a tubular structure with walls of dense compact or cortical bone and a central marrow-containing cavity The extremities of the bone are filled with a spongework of bony trabeculae This open trabecular tissue is termed cancellous bone There is every gradation between widely meshed cancellous bone and compact bone Inorganic bone salts are deposited in and impregnate fibrillar collagenous tissue The calcified matrix forms the interstitial substance which is arranged in thin lamellae (A), is perforated by fine canals containing blood vessels and nerves, and is also richly permeated with bone cells or osteocytes On the surface the lamellae are disposed in flat layers immediately beneath the periosteal tissues In the substance of the shaft they are arranged in concentric rings around the fine canals which penetrate the bone everywhere, usually in a longitudinal direction These are the Haversian canals (B) They are about 50 micra in diameter Each contains a minute artery and vein accompanied by fine nerve fibers loosely enmeshed in reticular tissue The canals branch and anastomose with each other and provide essential channels for carrying blood into the bone substance They open at the surface of the bone and communicate with the marrow cavity Each canal and its series of encircling lamellae comprise an Haversian system. Between the lamellae are minute oval cavities (lacunae) (C) from which extend fine branching canaliculi (D) Each lacuna is completely occupied by an osteocyte These cells are derived from bone forming cells (osteoblasts) and probably retain the capacity to take on osteoblastic functions

Periosteum: Each bone is ensheathed in a tough membrane, the periosteum, which consists mainly of white fibrous tissue and a small element of elastic fibers It arises from the perichondrium Beneath this layer is looser connective tissue which is highly vascular and contains cells capable of becoming osteoblasts

Ossification: Ossification of bone takes place by (1) endochondral, and (2) intramembranous ossification In the former transformation of cartilage into bone takes place at the zone of provisional calcification The exact nature of this transformation is not clear In intramembranous ossification bone is laid down directly in connective tissue

In a simple long bone such as the tibia, the shaft is ossified from a single primary center Before the 8th week of fetal life it is composed entirely of hyaline cartilage and enclosed in a membranous sheath, which stage is called the perichondrium The first indication of ossification is a change in the cartilage cells in the middle of the shaft They become large and vacuolated and tend to arrange themselves in rows Coincidentally, calcium salts are deposited in the cartilaginous matrix which apparently cuts off the nutrient supply to many of the enclosed cartilage cells so that they undergo rapid degeneration Meanwhile, the perichondrium at the middle of the shaft becomes active and true bone is laid down as a thin shell on the surface by the process of intramembranous ossification This is the subperiosteal bone of the shaft (for the perichondrium must now be called periosteum) The two important cell types are osteoblasts (E) and osteoclasts (F) [illegible] former cells are concerned chiefly with the formation of bone and [illegible] rounded or oval with a large nucleus which stains deeply They [illegible] in rows on the surface of newly deposited bone ar[illegible] apparent [illegible] where there is no active osteogenesis or where [illegible] lasts are large multinucleated cells of irreg[illegible] is taking place these cells are [illegible] direct[illegible] bony tissue, and appear to be eroding it

CORTICAL BONE HAVERSIAN SYSTEM

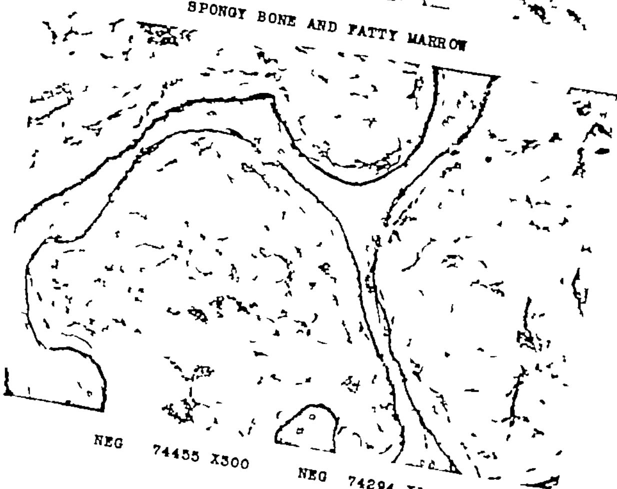
A

B

C

D

SPONGY BONE AND FATTY MARROW



NEG 74455 X300

NEG 74294 X100

STUDY OF BONE

In any study of diseases of bone it is essential to consider morbid anatomy only as an adjunct to the establishment of a diagnosis In other words, the microscopic anatomy should be considered in relation to the history, clinical symptoms, X-ray findings and the course of the disease

Whenever feasible it is highly desirable to take X-ray photographs of specimens of bone before they are sectioned In this manner it is possible to obtain a clearer picture of the detailed structure of the specimen It is essential that information of this nature be obtained so that one may have a clearer correlation between the roentgenologic and histologic structure of bone

Bacteriologic studies are usually neglected and in certain cases should be done

Pieces of bone somewhat larger than desired for study are sawed from the specimen Special attention should be given to the plane of the section which should be taken so that it will show both transverse and longitudinal structure of cortical bone The tissues are now placed in 10% formalin or Zenker formol for fixation Following fixation they are decalcified in 10% nitric or formic acid

The bone must be watched closely and decalcification stopped as soon as the process is complete When the bone salts are removed the section is carefully trimmed with a sharp knife to the desired size and thoroughly washed The tissues are then treated in the same manner as other tissues, that is, they are dehydrated, cleared, embedded, sectioned and stained

In examining bone sections with the microscope it is desirable to follow some regular sequence; for example, first the periosteum, next cortical bone and finally bone marrow

One should examine each of the following

(1) Thickness of the periosteum.
(2) Subperiosteal proliferation of bone
(3) The architecture of cortical bone with special attention to alterations in the Haversian system.
(4) Size and structure of trabeculae of spongy bone
(5) The number of osteoblasts and osteoclasts
(6) The number and characteristics of osteocytes
(7) The deposition of bone as indicated by lamination of the trabeculae
(8) The presence of osteoid about bone trabeculae
(9) Bone marrow

INFLAMMATION

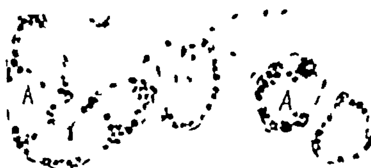
Important to the understanding of pathologic processes, no matter in what field you wish to study them, *is a thorough knowledge of* inflammation, a continuous process that occurs in three stages: hyperemia, exudation, and resolution or repair Between these stages there are no pauses and much overlapping In the stage of hyperemia the blood vessels (A) are dilated and the endothelial lining cells are prominent and perhaps slightly swollen *The increased rapidity of blood flow* plus vascular dilatation results in increased local heat and color With a later decreased rapidity of *flow*, the leucocytes *move from the center to the* periphery of the stream and adhere to the walls, -- the so-called "margination of leucocytes" Bilobed and trilobed polymorphonuclear leucocytes are easily distinguished (see also "Inflammatory Cells")

The stage of exudation, in which there is increased permeability of the capillaries, is manifested by migration of leucocytes (B) through the vessel walls into the surrounding stroma *Serum* has already escaped and the resulting edema is indistinctly shown Macrophages, large mononuclear cells, may appear in the exudate after two or three days Fibrin (C) appears in varying amounts according to the character of the etiologic agent The little thickenings occurring at the points of intersection of the fibers, called nodal points (D), are useful in differentiating fibrin from connective tissue fibrils As inflammation becomes subacute more large mononuclears and fibroblasts (E) appear, active exudation and repair proceeding concomitantly

Chronic inflammation is characterized by: the formation of fibrous tissue through the proliferation of spindle shaped fibroblasts (E); the budding of new capillaries (F) resulting in a very vascular structure, granulation tissue; an abundance of lymphocytes and plasma cells, a variable number of eosinophiles, both mononuclear and polynuclear, and a few polynuclear leucocytes Giant cells may be found also, particularly in the presence of foreign bodies

Primarily exudative are the foregoing reactions, which typically result from pyogenic infections or by physical agents Decidedly different is the primarily productive granulomatous type of inflammation which is characterized by the presence of epithelioid cells, Langhans' giant cells, and necrosis The typical example of infectious granuloma is tuberculosis Other examples are syphilis, sympathetic ophthalmia, typhoid fever, lymphopathia venerea, tularemia, and some fungus infections

INFLAMMATION



NEG 66903 X280



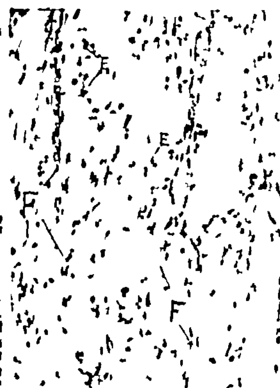
NEG 66912 X280



NEG 41217 X600 NEG 67361 X1000



NEG 66940 X 300



NEG 48007 X 180

INFLAMMATORY CELLS

The type cells of inflammation are shown, all at the same magnification

A Polymorphonuclear neutrophil
B Polymorphonuclear eosinophil
C Lymphocyte
D Plasma cell
E' Macrophage with phagocytosed cell fragments
E Macrophage
F Foreign-body giant-cell
G Langhans' giant-cell
H Tumor giant-cell

Neutrophiles (A), polys, Metchnikoff's microphages, are the characteristic (pus) cells of an acute inflammatory exudate Eosinophiles (B), which are discerned by their uniformly sized, moderately large granules, are common in allergic and some parasitic reactions and are also seen in chronic inflammations, particularly of the upper respiratory tract They may be mononuclear ("tissue eosinophiles") or polymorphonuclear Lymphocytes (C), small round cells, are the characteristic cells of a chronic inflammatory exudate They probably are derived both from the blood and from the fixed tissues Plasma cells (D), recognized by their pear-shaped bluish cytoplasm and eccentric nuclei with peripheral (so-called "spoke" or "wheel nuclei") arrangement of chromatin, also are characteristically present in a chronic inflammatory cell exudate and are particularly prominent in syphilis They are thought to be derived from lymphocytes, Reticulo-endothelial macrophages (E) variously called large mononuclears, monocytes, histiocytes, clasmatocytes, polyblasts, reticulum cells, and wandering cells, have been described by Aschoff as originating in the reticulo-endothelial system, a concept more physiologic than anatomic From those cells arise also the epithelioid (called by some "endothelioid") cells (K) which are characteristic of infectious granulomata Langhans' giant-cells are thought to be formed usually by the fusion of epithelioid cells Foreign bodies, such as injected paraffin, various missiles, penetrating debris incident to trauma, or as metabolic crystals like cholesterol or urates, are usually phagocytosed by foreign-body giant-cells (F) Tumor giant-cells (H, from a case of osteogenic sarcoma) usually have centrally placed nuclei in contrast to the peripheral nuclear arrangement of most inflammatory giant-cells

References: 1 Aschoff, Ludwig Lectures on Pathology New York, Paul B Hoeber, Inc , 1924

2 Adami, J G Inflammation: An Introduction to the Study of Pathology Being the reprint (revised and enlarged) of an article in Professor Allbutt's 'System of Medicine' London, MacMillan & Co , 1907

CELLS

LEUCOCYTES



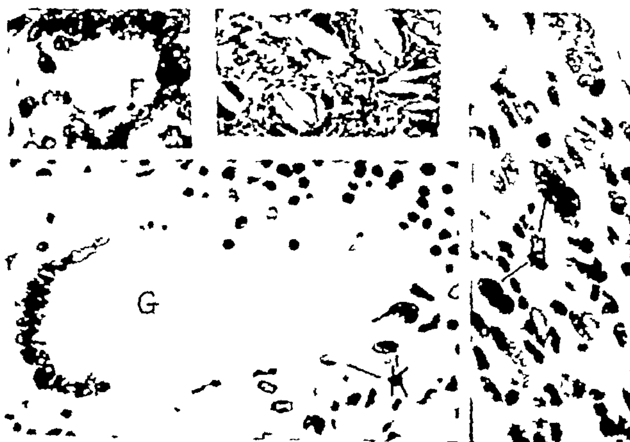
LYMPHOCYTES, PLASMA CELLS



RETICULO-ENDOTHELIAL MACROPHAGES



GIANT-CELLS



NEG 87363 X1000

Accession 81345

Registered by
Army Medical Museum
Washington, D C

EXOSTOSIS - TIBIA

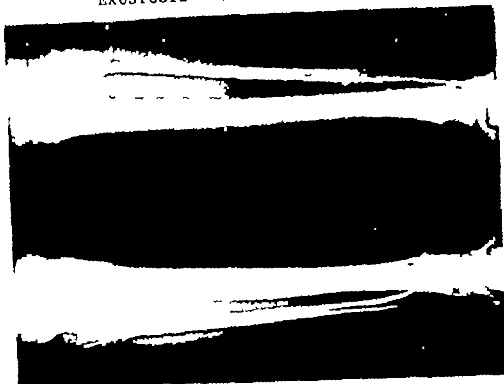
CLINICAL NOTE The patient is a white man, 26 years of age, who was admitted to the hospital with melanosarcoma During the physical examination a number of exostoses were felt about the end of several long bones This finding was confirmed by X-ray examination He died six months after admission An autopsy was performed and several of the exostoses were removed and sectioned

X-RAY Several exostoses were noted along the shafts of both humeri Similar growths were observed about both tibiae and fibulae

MICROSCOPIC: There is an outgrowth of cortical bone (A) covered by periosteum (B) The main structure of this exostosis is composed of spongy trabeculated bone (C) throughout which is interspersed fatty bone marrow (D) The bone varies considerably in thickness At the end of the protuberance there is a considerable amount of hyaline cartilage (E)

Slide No 1

EXOSTOSIS - TIBIA ACC 81345





NEG 74169 NEG 74376 X6

Accession 80331

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Army Medical Museum
Washington, D C

HETEROPLASTIC BONE FORMATION

CLINICAL NOTE: The patient is a colored man, 23 years of age, who was killed in an automobile accident

PATHOLOGY A scar was present in the mesocolon in the region of the hepatic flexure A similar scar was found in the mesentery of the large intestine Both measure about 1 5 cm. across There is no mention of any lesion in the gastrointestinal tract A section of the scar from the mesentery of the large intestine shows a lymph node with a moderate amount of hyperplasia and adjacent to it there is a fairly extensive area of fibrosis (A) Through this is scattered occasional muscle fibers In the center of the scar there are numerous densely eosinophilic bone trabeculae which apparently represent fibrous bone (B) and are non-laminated In some of these spicules there is an attempt to form bone marrow (C)

Reference: The formation of bone under the influence of epithelium of the urinary tract Huggins, C B , Archives of Surgery 22: 377, 1931

Slide No 2

HETEROPLASTIC BONE FORMATION ACC 80331



NEG 73824 X140

Accession 77440

Registered by
Army Medical Museum
Washington, D C

OSTEOGENESIS IMPERFECTA

CLINICAL NOTE: The child was a breech delivery and weighed 1840 grams At birth it was noted that the baby was markedly deformed and that there were multiple fractures and a hydrocephalus The child was cyanotic, had labored respirations and died three days after birth

X-RAY: All the bones show evidence of imperfect bone formation characterized by decreased density There are both old and recent fractures There is a large callus in the mid-part of the right radius and a recent fracture of the bones of the left tibia

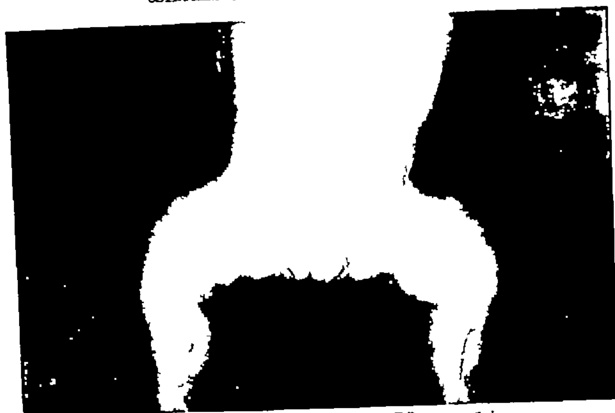
PATHOLOGY: At autopsy the sclerae were blue and there were multiple fracture deformities of the extremities A microscopic examination of bone shows the bone marrow to be entirely out of proportion to the supporting bone structure The bone spicules (A) are imperfectly formed and have more of the characteristics of cartilage than bone Within the bony spicules one frequently sees rather large vacuolated spaces Osteoblasts (B) are rarely seen and there is a very thin border of pink-staining osteoid (C) about a few of the bone trabeculae The parathyroids were described as normal

References: 1 Weber, M Osteogenesis Imperfecta Congenita Arch Path. 9: 984, 1930

2 Riesenman, F R & Yater, F M Osteogenesis Imperfecta: Its Incidence and Manifestations in Seven Families Arch Int Med 67: 950, 1941

Slide No 3

OSTEOGENESIS IMPERFECTA ACC 77440



NEG 72933 NEG 73788 X160

Accession 87277

Registered by
Dr Sidney Farber,
Childrens' Hospital
Boston, Mass

SCURVY

CLINICAL NOTE: A female infant 9 months of age admitted because of tenderness of the chest and extremities of one month's duration Orange juice started at 3 months An adequate amount of cod liver oil was offered Development had been slow

One month before entry there was anorexia, failure to gain and resentfulness to handling There was swelling of the eyelids 3 weeks prior to admission Three days before entry the arms and legs were tender and the child lay in a frog position The urine became dark, there were scattered areas of ecchymosis and vomiting occurred

Blood ascorbic acid was less than 0 1 to 0 6 mg % (normal 0 8 to 1 0 mg %)

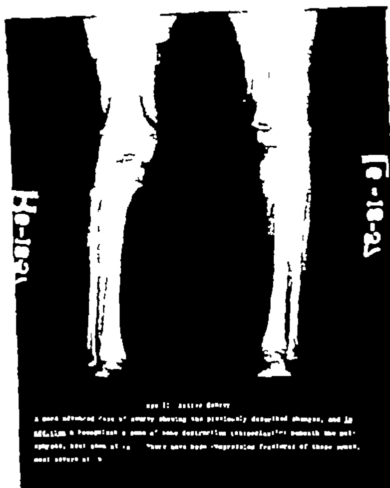
X-RAY There is irregularity and thickening of the epiphyseal lines of femora, tibia and fibulae

PATHOLOGY A longitudinal section through the costochondral junction of a rib shows an irregular line in the zone of provisional calcification (A) There is an excess of calcified cartilage (B) that is apparently being transformed into poorly developed bone trabeculae (C) There is a moderate amount of pink staining osteoid about some of the trabeculae There are a considerable number of osteoclasts present The bone marrow is replaced by fibrous connective tissue in several areas There is a moderate amount of hemorrhage (D) in the marrow spaces and a considerable number of cells that contain blood pigment

Reference Scurvy, past and present Hess, A F , Lippincott, 1920

Slide No 4

SCURVY ACC 87277





NEG 73957 NEG 74147 X125

Accession 87279

Registered by
Dr Sidney Farber
Childrens' Hospital
Boston, Mass

RICKETS

CLINICAL NOTE A three and one-half month old infant who was born with an omphalocele This was repaired a few days after birth The child began to vomit one month after operation and was admitted to hospital with signs of intestinal obstruction A laparotomy was performed and an accessory lobe of the liver was found obstructing the duodenum The obstruction was relieved but the child developed post-operative hemorrhage and died

X-RAY: There is enlargement and considerable irregularity of the costochondral junctions

PATHOLOGY A longitudinal section through the costochondral junction of a rib shows a number of conspicuous features The hyaline cartilage cells (A) are very irregular in their arrangement There is no sharp line of demarcation between cartilage and bone (zone of provisional calcification) The bone trabeculae are not normal They are composed of irregular clumps of calcified cartilage (B) covered by irregular bands of pink staining material usually termed osteoid (C) The marrow spaces in this region are composed largely of fibrous connective tissue (D) There are large numbers of osteoblasts about most of the trabeculae

Reference Observations on the Pathology of Rickets with particular reference to the changes at the cartilage-shaft junctions of the growing bones Park, E A, Lectures,
Williams Wilkins, 34 157, 1939

RICKETS ACC 87279





NEG 73960 NEG 74145 X125

Accession 80407

Registered by
Army Medical Museum
Washington, D C

FRACTURE OF RADIUS - 3 DAYS

CLINICAL NOTE: Patient is a male, white, 28 years of age Fell from horse and fractured the right arm, dislocating the head of the radius and locking the joint Three days later a simple surgical excision was done to remove the head of the radius Blood clots were present in the joint space

X-RAY: There is a transverse fracture of the head of the radius

PATHOLOGY: Specimen consists of the head of the radius Microscopic examination reveals hyaline cartilage bone There is a fracture extending through bone and cartilage Near the site of the fracture there is some hemorrhage (A) in the bone marrow spaces and there is extensive comminution (B) of several bony trabeculae There is little evidence of degeneration of bone and there is no evidence of osteoclasis at this time There is no evidence of callus formation in the sections

Slide No 6

FRACTURE OF RADIUS - 3 DAYS ACC 80407





NEG 73947 NEG 74298 X10)

Accession 79848

Registered by
Army Medical Museum
Washington, D C

FRACTURE OF RADIUS
(2 months)

CLINICAL NOTE: Patient is a white male 25 years of age who fell on the forearm and fractured head of the radius two months previously X-ray showed dislocation of fragment There was pain associated with movement and considerable restriction of pronation and supination The head of the radius was removed surgically

X-RAY: There is an irregular transverse fracture involving the head of the radius

PATHOLOGY: The specimen consists of the head of the radius There is an old fracture with separation of the fragments separated by fibrous connective tissue so that there has not been complete healing On microscopic examination there is radial cartilage and attached bone The bony fragments are separated by fairly dense fibrous connective tissue (A), fibrocartilage and some fairly well developed hyaline cartilage (B) There are a considerable number of blood vessels throughout the fibrous connective tissue; however, there is no evidence of normal bone being laid down in this callus

Reference: Calcification and Ossification Urist, M. R and McLean, F C Jour Bone and Joint Surg 23: 1, 1941

Slide No 7

FRACTURE OF RADIUS ACC 79848





NEG 73948 NEG 73740 X150

THE PATHOGENESIS OF OSTEOMYELITIS

This disease is caused by the hemolytic staphylococcus aureus in about 90 per cent of cases The infection usually arises from a focus such as a furuncle, blister, burn impetigo or omphalitis such a focus or portal of entry is demonstrable in only 25 per cent of cases Trauma is considered to be an important factor in the causation The disease is twice as common in boys as in girls

The infection occasionally occurs by direct extension as in the mastoid cells and in the terminal phalanx of the finger secondary to infection in the pulp Infection is also frequently implanted into the bone following compound fractures

It is most probable that the primary localization of bacteria occurs in the metaphysis near the epiphyseal line

The ensuing pathological changes that take place are similar to those in acute infections elsewhere However, the picture is considerably modified by the fact that the involved tissue is contained within a rigid compartment of bone The process spreads from within outwards and follows the line of least resistance When it begins in the metaphysis near the epiphyseal line it does not invade the cartilaginous plate but spreads laterally through the cortical bone and appears beneath the periosteum The periosteum is then elevated by the inflammatory exudate, it becomes purulent and the pressure of the abscess strips the periosteum along the shaft of the bone It may also completely encircle the shaft

The disease may follow one of several courses: a large number of bacteria may reach the blood stream causing death or the infection may be modified by the resistance of the patient so that it is walled off as an abscess and surrounded by a wall of chronic inflammatory tissue and later by eburnated bone

During and after the acute phase of the disease certain important phenomena occur the most important of which are absorption and necrosis of bone, separation of sequestra and the new bone formation

In acute osteomyelitis there is absorption of living bone The nature of the process is not well understood However, it probably can be attributed to proteolytic enzymes in the inflammatory exudate although this is a controversial point Absorption is apparent first in cancellous bone and then extends to cortical bone The Haversian canals are enlarged, the cortex gradually eroded and finally perforated Necrosis of bone is probably caused by an interference with the circulation of bone and also by the necrotizing toxins elaborated by the etiologic agent, especially in infections due to the staphylococcus aureus A piece of unabsorbed dead bone is known as a sequestrum Dead bone is frequently covered by new bone and eventually may become incorporated in the latter Most infections of bone stimulate osteoblastic formation and consequently new bone is formed This is especially so in the case of the periosteum which carries osteoblasts with it when stripped away from the shaft Occasionally the entire periosteal covering is separated and an outer sheath of new bone is formed This is termed an involucrum

Accession 77242

Registered by
Army Medical Museum
Washington, D C

SINUS TRACT IN OSTEOMYELITIS

CLINICAL NOTE The patient is a white male, 18 years of age, with recurrent osteomyelitis of the left tibia The patient had a persistent draining sinus which was removed surgically

PATHOLOGY The section is composed largely of skin, subcutaneous tissue and muscle There is a considerable loss in continuity of the epithelium. In some areas the epithelium is necrotic and infected but it has not been completely destroyed There is an extensive inflammatory exudate (A) extending through the subcutaneous tissues and into the muscle This varies from focal abscesses composed largely of polymorphonuclear leukocytes to areas of fibrosis with a few scattered lymphocytes There are numerous areas of both recent and old hemorrhage In a few areas monocytes are collected in the form of giant cells At the central part of the section necrosis is most extensive and there is a sinus tract that extends for a considerable distance into the inflammatory tissue

Slide No 8

SINUS TRACT IN OSTEOMYELITIS ACC 77242



SINUS TRACT

NEG 73785 X100 NEG 74477 X1000

Accession 56883

Registered by
Army Medical Museum
Washington, D C

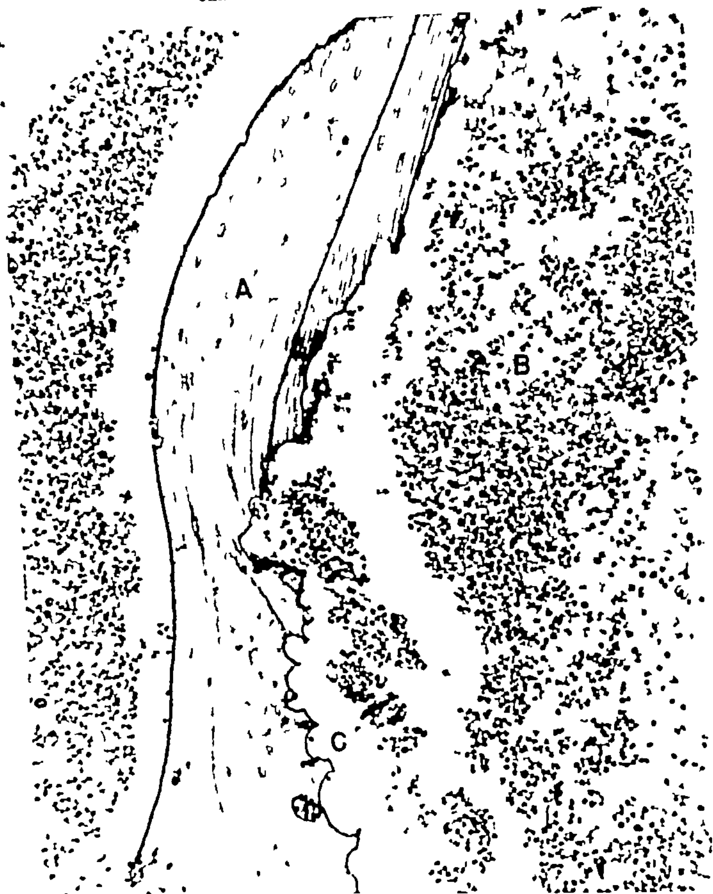
CHRONIC OSTEOMYELITIS

CLINICAL NOTE Patient is a white man, 19 years of age, who had had osteomyelitis of the right leg for 11 years A sequestrectomy was done

PATHOLOGY: The specimen consists of an irregular spongy piece of bone that measures 4 x 2 x 2 cm Microscopic examination reveals scattered bony trabeculae (A) between which there is an inflammatory reaction (B) that consists largely of polymorphonuclear leukocytes and a moderate number of mononuclear cells There is no frank abscess formation and in some areas there is beginning fibrosis The edges of the most of the trabeculae are irregular (C) and in some instances the trabeculae have undergone complete disintegration

Slide No 9

CHRONIC OSTEOMYELITIS ACC 56883



NEG 73820 X265

Accession 70581

Registered by
Army Medical Museum
Washington, D C

CHRONIC OSTEOMYELITIS

CLINICAL NOTE Negro male, 50 years of age In 1929 he struck his right leg against a wheelbarrow rupturing a varicose vein just above the ankle A superficial ulcer developed at this site and did not heal during a period of 10 years Physical examination was essentially negative except for the draining varicose ulcer There were three positive Kahn tests The patient received extensive antiluetic treatment while in the hospital and the ulcer healed satisfactorily for a time, but never completely

X-RAY There is extensive increase in density over most of the tibia and fibula and there is considerable periosteal thickening over the surface of both bones The leg was finally amputated

PATHOLOGY Section through the tibia shows very dense bone trabeculae (A) with little fibrous connective tissue (B) occupying the spaces between There is no normal marrow in the section but in a few areas there is fatty marrow (C) Although there is little evidence of inflammation in the bone there are scattered collections of lymphocytes between the bone trabeculae The periosteum is considerably thickened and is replaced with hyalin fibrous connective tissue and superficially there is the base of a chronic ulcer

Slide No 10

CHRONIC OSTEOMYELITIS ACC 70581





NEG 70940 NEG 73777 X150

Accession 40258

Registered by
Army Medical Museum
Washington, D C

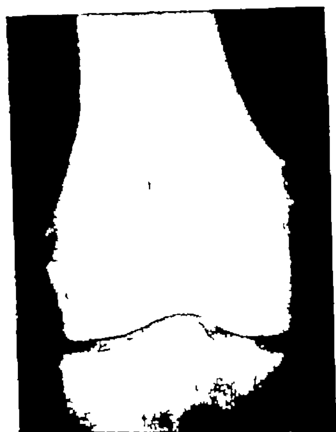
CHRONIC OSTEOMYELITIS
(Brodie's Abscess)

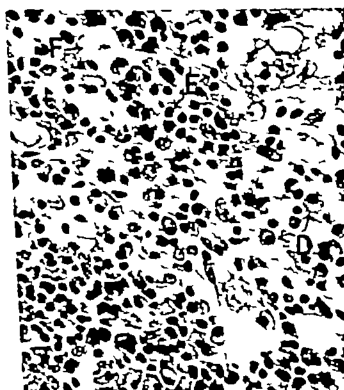
CLINICAL NOTE: The patient is a white male, 45 years of age, with a history of chronic cough for many years, considered to be chronic bronchitis and bronchiectasis During his stay in the hospital a diagnosis of Brodie's abscess of the distal end of the right femur, cause undetermined, was made

X-RAY: In the antero-posterior view just above the lateral condyle there is a sharply circumscribed area of decreased density surrounded by denser bone In the lateral view there is an area of decreased density in the femur just proximal to the epiphyseal line and in this area one can make out a few areas of lesser density

PATHOLOGY At autopsy the diagnosis of bronchiectasis was confirmed A section through the lower end of the femur just above the epiphysis showed a small circumscribed area that contained semi-fluid exudate This area is surrounded by a dense wall A section through this area is composed for the most part of dense fibrous connective tissue throughout which are scattered occasional blood vessels At the periphery there is a bony wall and the bone is composed of unusually dense trabeculae In a few areas there are collections of osteoblasts at the junction of the fibrous connective tissue (A) and bone (B) suggesting new bone formation In the central part of this area there is a dense collection of cells (C) composed for the most part of plasma cells (D) and lymphocytes (E) There are also large numbers of large vacuolated macrophages apparently containing fat (F) A moderate number of small endothelial lined vascular spaces are scattered throughout the granulation tissue

BRODIE'S ABSCESS ACC 40258





NEG 60654 NEG 60688 X12 NEG 60690 X680

Accession 77770

Registered by
Army Medical Museum
Washington, D C

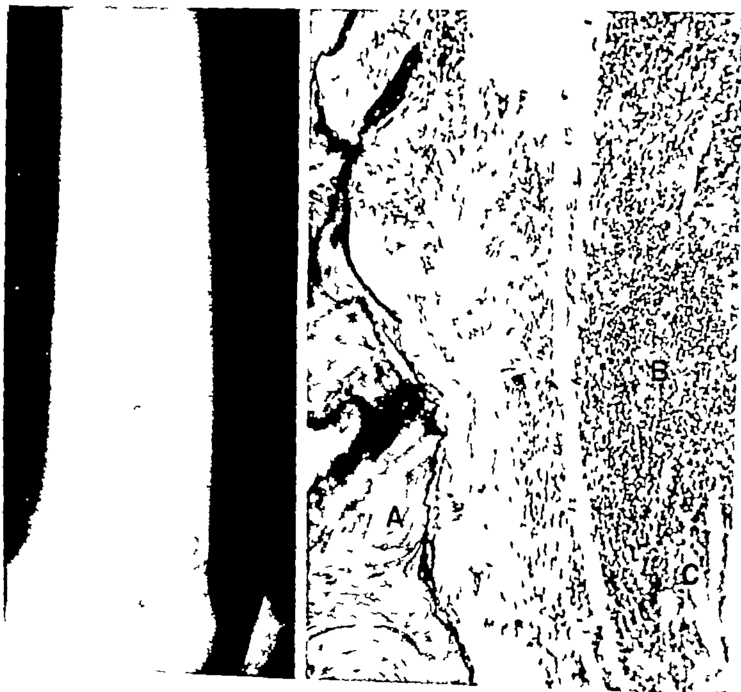
CHRONIC OSTEOMYELITIS
(Brodie's Abscess)

CLINICAL NOTE A white male, 25 years of age, with an old abscess in the femur No more history available

X-RAY There is a circumscribed area of rarefaction a few centimeters above the distal head of the femur There is a rather regular increase in density throughout the shaft of the femur

PATHOLOGY Several bony fragments were removed at operation On microscopic examination of a piece of bone adjacent to the infected site there is a very definite increase in the size of the bony trabeculae (A) The bone marrow is aplastic and there are circumscribed areas of chronic granulation tissue (B) in which the predominant cell is the plasma cell In numerous areas cholesterol crystals have apparently been present in the section (C) In one or two areas there is an attempt at new bone formation characterized by proliferation of osteoblasts There is no evidence of bone destruction

CHRONIC OSTEOMYELITIS ACC 77770



NEG 72809 NEG 73790 X150

Accession 81324

Registered by
Dr Hewitt Ragsdale
Sumter, S C

CHRONIC OSSIFYING PERIOSTITIS

CLINICAL NOTE: The patient is a white male 34 years of age who suffered a laceration of his finger 6 months ago following which a piece of glass was buried in the periosteum. This was supposedly removed but a hard knot gradually appeared at the site of the injury There was gradual development of a bony tumor over which the skin was tighter than usual The clinical diagnosis was exostosis

PATHOLOGY Specimen consists of a small piece of bone covered by dense fibrous connective tissue Microscopic examination reveals a spherical nodule of bone composed largely of laminated bony trabeculae (A) Between the trabeculae there is considerable fibrosis, the nodule is surrounded by fibrocartilage (B) and fibrous connective tissue (C)

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CHRONIC OSSIFYING PERIOSTITIS ACC 81324



NEG 73803 X265

Accession 87238

Registered by
Dr Henry L Jaffe
Hospital for Joint Diseases
New York, N Y

OSTEOID OSTEOMA

CLINICAL NOTE Patient is a girl, 12 years of age, whose first symptom was a dull pain on the medial aspect of the upper part of her right leg The pain was not severe, it usually occurred in the morning and was occasionally noted in the evening after an active day There was no limitation of motion There was a slight local swelling Palpation revealed a local diffuse fullness on the antero-medial aspect of the right tibia just below the condyle

X-RAY There is an irregular area of rarefaction on the inner surface of the epiphyseal plate The adjacent bone cortex was somewhat thickened

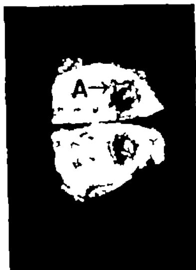
PATHOLOGY The area of rarefaction was removed A transverse section through the bone reveals a circumscribed circular area (A) about 1 cm across surrounded by a narrow clear zone of fibrous marrow The rest of the cortical bone shows no conspicuous lesion, however At the periphery of the involved area there are a large number of osteoblasts (B) surrounding bone trabeculae In the central part there is considerable calcified bone (C) surrounded by pink staining osteoid (D) There are large numbers of osteoclasts (E) in the section There is much intertrabecular fibrosis (F)

Reference Jaffe, H L Osteoid Osteoma J Bone & Joint Surg 22: 645, 1940

Slide No 14

OSTEOID OSTEOMA ACC 87238







NEG 73961 NEG 74299 X100

Accession 81126

Registered by
U S Soldier's Home
Washington, D C

MILIARY TUBERCULOSIS OF VERTEBRA

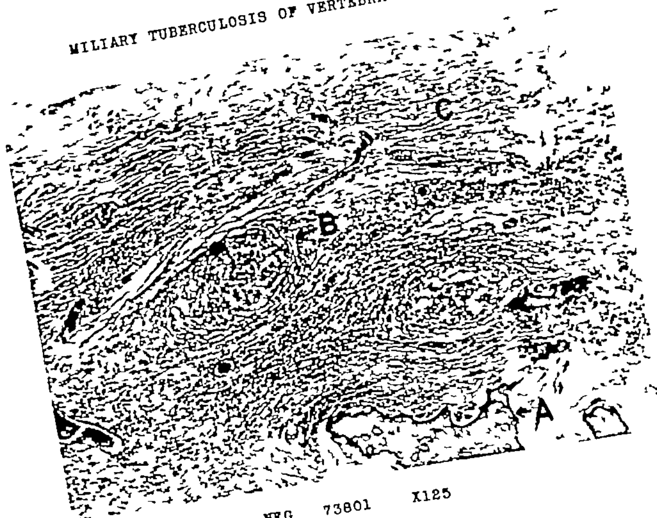
CLINICAL NOTE: This patient was an elderly man with chronic pulmonary tuberculosis in whom there was a terminal miliary spread

PATHOLOGY: At autopsy there was extensive fibro-caseous pulmonary tuberculosis with miliary tubercles in the spleen, liver, pancreas and gastrointestinal tract There was a tuberculous pyelonephrosis of the right kidney and miliary tuberculosis of the left Osteomyelitis of the lumbar spine with psoas abscess was found

Microscopic examination through one of the lumbar vertebra shows cortical and spongy bone Between the bony trabeculae there is considerable fibrosis (C) of the bone marrow with a moderate lymphocytic infiltration In some areas the trabeculae have undergone considerable disintegration and are replaced by caseous material through which is interspersed scattered fragments of calcified bone (A) One sees several osteoclasts in the neighborhood of the disintegrating bone There are also several minute focal collections of epithelial cells that represent miliary tubercles (B)

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MILIARY TUBERCULOSIS OF VERTEBRA ACC 81126



NEG 73801 X125

Accession 55558

Registered by
Dr W G Lewis
Winslow Indian Sanitarium
Winslow, Arizona

SYPHILITIC OSTEOMYELITIS

CLINICAL NOTE The patient is an Indian girl, 13 years of age who injured her left elbow 5 years previously Since then there has been pain and swelling of the lower half of the humerus Examinations for evidence of tuberculosis have been negative, as has been the Wassermann Because of the great swelling of the humerus the bone was amputated at the surgical neck

X-RAY This shows widening and sclerosis of the lower half of the humerus with secondary areas of erosion and there is little evidence of periosteal reaction

PATHOLOGY Microscopic examination reveals rather large compact bone trabeculae (A) throughout which are interspersed areas of fibrous connective tissue (B), in many places loose in texture, in others there are minimal collections of inflammatory cells, largely lymphocytes In some areas the cellular infiltration is somewhat more extensive and there is a tendency for the fibrous connective tissue to undergo degeneration and in some areas definite necrosis (C)

COMMENT: This case has been reviewed by numerous competent pathologists and there has been considerable difference of opinion Although the diagnosis is not entirely clear, the histopathology is consistent with a diagnosis of syphilis

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SYPHILITIC OSTEOMYELITIS ACC 55558



A

B

C

NEG 64482 NEG 71075 X75

Accession 80526

Registered by
Army Medical Museum
Washington, D C

BOECK SARCOID OF BONE

CLINICAL NOTE: The patient is a colored male, 17 years of age He injured his thumb in December 1931 and was admitted to the hospital with swelling and ulceration He states that this ulceration had been present for two years and that one year ago there was marked swelling in the region of the wrist associated with pain A similar condition developed in the right hand somewhat later On physical examination most of the fingers were enlarged and seemed to be due to an increase in bone

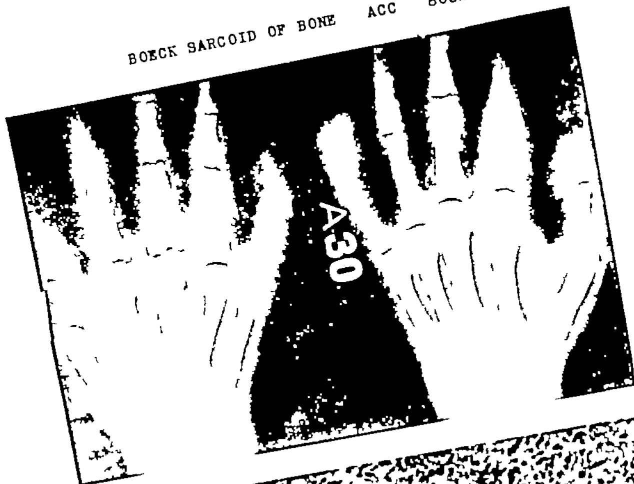
X-RAY: Both hands show widespread lesions on the phalanges and metacarpals caused by the present of cysts and polycystic configurations The cortex was broken in some areas Differential diagnosis lay between tuberculous dactylitis and sarcoid, the former being favored Similar lesions were seen throughout the appendicular skeleton However, the axial skeleton was almost entirely spared

PATHOLOGY A lymph node was removed and a diagnosis of Boeck's sarcoid was made Later a finger was removed and on section the bone was soft and the subcutaneous tissues flabby On microscopic examination in the region of the knee joint there is an extensive granulomatous process infiltrating the subcutaneous tissue and bone The nature of the granuloma is fairly uniform. It is composed largely of epithelioid cells (A) which have a tendency to clump in the form of multinucleated giant cells In turn these clusters have a tendency to form larger somewhat isolated groups In addition to this type of cell there is a moderate amount of fibrosis and a moderate number of lymphocytes (B) through the section The walls of the blood vessels are greatly thickened Note absence of caseation necrosis

Reference: Sarcoidosis or Besnier-Boeck-Schaumann Disease Longcope, W T , Jour Amer Med Assoc , 117: 1321, 1941

Slide No 17

BOECK SARCOID OF BONE ACC 80526



NEG 73721

NEG 73943 X330

Accession 62152

Registered by
Army Medical Museum
Washington, D C

ACTINOMYCOSIS OF VERTEBRA

CLINICAL NOTE: Patient is a white man, 28 years of age, who was discharged from the Army with a diagnosis of tuberculosis of the right eye in 1935 He was well until 1938 when he had severe pain in the lower back which was present for six months prior to admission to the hospital There was limitation of motion in the spine However, the X-rays were negative Ten days after admission he developed bronchopneumonia following which several deep seated muscular abscesses appeared in all parts of the body They developed slowly, were rather painful and there was little reaction about them No causative agent was isolated The white blood count was in the neighborhood of 15,000, and gradually declined to 4,100 The pain in the back increased and X-ray showed considerable damage of the 9th to the 12th dorsal and the 1st lumbar vertebra associated with considerable depression This lesion was suggestive of tuberculosis but not considered characteristic No X-ray available

PATHOLOGY An autopsy was performed and there were multiple abscesses in the lungs There was a fibrinous pericarditis and a large abscess of the right kidney There is an acute angular kyphosis at the 12th dorsal spine with practically complete destruction of two vertebrae Section of the last lumbar vertebra shows scattered spicules of bone that show considerable evidence of disintegration In some areas there is moderate fibrosis of the bone marrow However, the most conspicuous feature is the presence of multiple abscesses composed largely of polymorphonuclear leukocytes In a few of these abscesses there are eosinophilic staining bodies with radiating strands that are fairly characteristic of ray fungi

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ACTINOMYCOSIS OF VERTEBRA ACC 62152



NEG 73814 X515

Accession 78078

Registered by
Army Medical Museum
Washington, D C

COCCIDIOIDAL OSTEOMYELITIS

(Coccidioides immitis)

CLINICAL NOTE: The patient is a white male, 35 years of age, born in Mississippi but located in Tuscon, Arizona prior to his illness About August 1931, he bumped his left shin bone on a truck This was followed by swelling in the region of the blow He reported sick the next morning Local therapy was not effective so that he was hospitalized for a period of one week X-rays were negative He was discharged and re-admitted after 3 weeks because of pain in his knee A diagnosis of periostitis of the left tibia was made He ran a low grade fever up to 101 and after a month a productive cough developed An X-ray diagnosis of miliary tuberculosis was made

X-RAY: There is a large area of bone destruction of the proximal third of the tibia There is a moderate amount of periosteal proliferation along the lateral aspect of this region and there is soft tissue swelling of this area The knee joint is uninvolved A diagnosis of chronic osteomyelitis was made

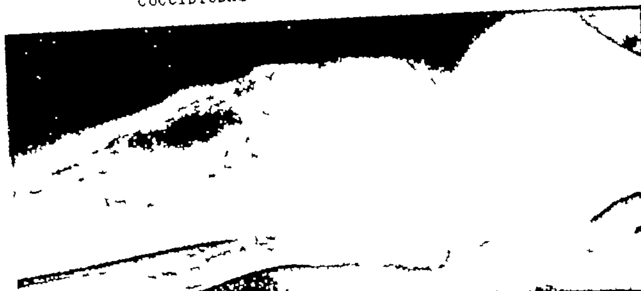
LABORATORY On November 1, pus was aspirated from the knee This was a mucoid, brownish fluid which contained round organisms with a double contour varying in size The organisms were grown culturally and a diagnosis made of coccidioides immitis On November 14 similar organisms were obtained by culture from the sputum.

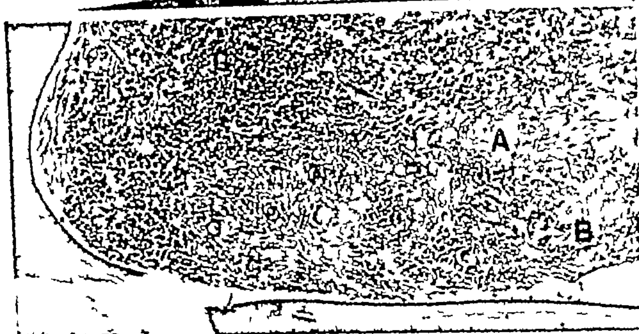
The patient died on November 17 and an autopsy was performed Organisms were found in the lungs, spleen, liver, upper end of left tibia, right ring finger, left ulna and the meninges

PATHOLOGY Sections from the tibia show an extensive osteomyelitis This is characterized in some areas by extensive necrosis (A) associated with some destruction of the bone as shown by the presence of osteoclasts In these areas there are large numbers of giant cells (B), many of which contain spherical bodies with a double contour In many of them one can discern endospores In add[illegible] the necrosis there are beginning focal abscesses composed lar[illegible] a-integrating leucocytes (C)

Reference: Coccidioidomycosis The [illegible] Acute
Fungus Coccidioides Dis[illegible] Jour
Assoc 111 1362 1938

COCCIDIODAL OSTEOMYELITIS ACC 78078







Accession 87278

Registered by
Dr Sidney Farber
Childrens' Hospital
Boston, Mass

HAND-SCHULLER-CHRISTIAN SYNDROME

CLINICAL NOTE The patient is a male 2½ years of age who was admitted to the hospital with polydipsia, polyuria stomatitis and loss of weight of six months' duration. Marked exophthalmos later developed Histologic examination of a cervical lymph node revealed a large number of eosinophiles and numerous pale lipid-laden cells Eleven years after the onset of symptoms, the patient was a blind, feeble-minded dwarf who exhibited marked spasticity

X-RAY: There are numerous circumscribed areas of bone destruction in the skull

PATHOLOGY: A section from the skull shows closely packed trabeculae of laminated bone (A) In some areas they stain intensely with basophilic dye, whereas in others they have apparently undergone fairly complete disintegration (B) The marrow spaces are compos[illegible] largely of fibrous tissue (C) It seems probable that this secti[illegible] came from a site that had been irradiated. There are a number of osteoclasts (D) in the section One sees an [illegible] macrophag[illegible] containing lipid material

A section from another case, A.M.H [illegible] is included to demonstrate macrophages (E) filled with [illegible]

Reference: Thannhauser, S [illegible] Lipidoses: Th[illegible] Cellul[illegible]
Metabolism. I [illegible] Oxford Univ Pr ,

HAND-SCHULLER-CHRISTIAN SYNDROME ACC 87278



E

E

B

B

A

C

D

NEG 73958 NEG 74144 X150 NEG 73772 X700

Accession 85492

Registered by
Army Medical Museum
Washington, D C

EOSINOPHILIC GRANULOMA OF BONE

CLINICAL HISTORY Patient is a white male 29 years of age who first complained of pain in the left chest after a fall against a 155 mm gun There was a bruise over the chest at the time

X-RAY The first plate showed thickened pleura over the 6th and 7th ribs, and subsequently destruction of the rib with pathologic fracture There was no bone in the area of the defect The last X-ray on the opposite page shows periosteal new bone formation about an expanded soft tissue mass X-rays of the skull, pelvis and long bones were negative

PATHOLOGY The specimen was a resected portion of the 6th rib measuring 7 5 x 2 0 x 1 0 cm There is a fusiform swelling of the central 4 cm. The periosteum is thickened Microscopic examination revealed areas of pale mononuclear cells throughout which are scattered collections of eosinophiles Numerous macrophages contain eosinophiles and golden brown pigment There is no bone tissue in the section

COMMENT: This case has been included to demonstrate a condition that has become of considerable interest The nature or significance of the lesion is not clear Some writers consider it to be a stage in the Hand-Schuller-Christian syndrome

References:

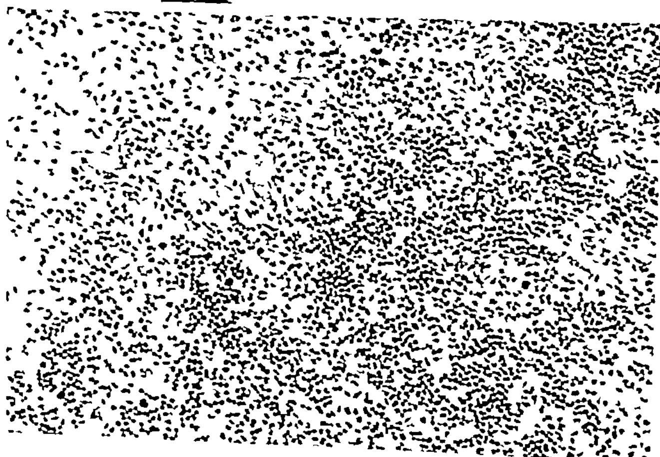
1 Lichtenstein, L & Jaffe, H L Eosinophilic Granuloma of Bone Am. J Path 16: 595, 1940

2 Green, W T & Farber, Sidney "Eosinophilic or Solitary Granuloma" of Bone J Bone & Joint Surg 24: 499, 1942

Slide No 21

EOSINOPHILIC GRANULOMA OF BONE ACC 85482





NEG. 73716 NEG 73806 X200

Accession 72406

Registered by
Army Medical Museum
Washington, D C

BONE CYST

CLINICAL NOTE A white man 22 years of age, was struck on left lower leg with a baseball bat in May 1940 Seven months later he complained of pain in the left leg while on a prolonged march Since then there has been occasional weakness and pain accentuated by exercise He was admitted to the hospital about this time and X-ray revealed a bone cyst Physical examination was entirely negative and there was no evidence of local bone deformity An operation was performed in February 1941 A window was made in the bone, the cyst opened, and contents removed The cyst was then packed with small fragments of bone and the wound closed A plastic cast was applied

X-RAY: There is a large elliptical cystic area of decreased density that occupies most of the metaphysis of the tibia

PATHOLOGY The tissue from the cyst weighs 8 grams and is mainly in the form of a sac 5 5 x 2 5 cm. The wall averages 1 to 3 mm in thickness The section is composed for the most part of a thick wall of dense hyaline fibrous connective tissue (A) that varies considerably in thickness Throughout this wall there are large numbers of longitudinal spaces, the site of cholesterol crystals (B) There is also a considerable amount of dense purple-staining material which represents calcium deposition Within this fibrous connective tissue wall there is considerable pale staining amorphous material, a small amount of blood, and large numbers of cholesterol crystals

Reference: Bloodgood, J C Benign Bone Cysts, Osteitis Fibrosa, Giant Cell Sarcoma and Bone Aneurism of the Long Pipe Bones Ann Surg 52: 145, 1910

BONE CYST ACC 72406



NEG 73779 X160

NEG 72506

Accession 77214

Registered by
Army Medical Museum
Washington, D C

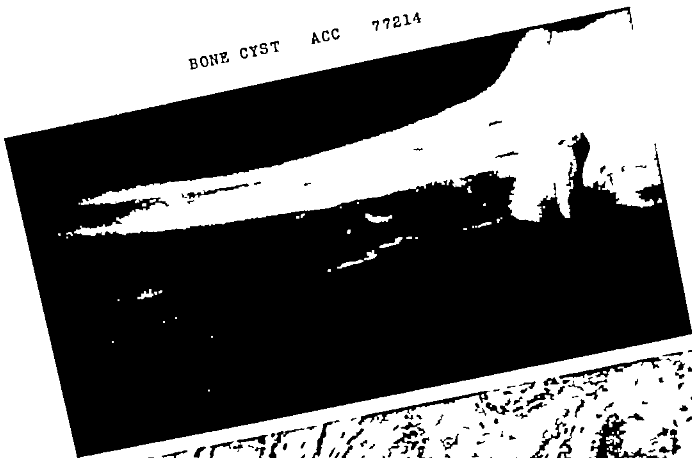
BONE CYST

CLINICAL NOTE A white male, 18 years of age A diagnosis of a solitary bone cyst of the upper third of the radius was made by X-ray examination. The cyst was curetted at that time but no histologic studies were made Following the operation there has been proliferation of bone into the incision which prevented healing of the wound

X-RAY: There is a longitudinal cyst involving more than the upper third of the left radius There is evidence of fracture in the mid part of the cyst An X-ray following operation shows considerable proliferation of bone about the cyst which is not sharply defined at this time

PATHOLOGY: The specimen consists of a piece of cancellous bone about 3 x 1 x 1 cm. A section through the tissue shows a large number of bony trabeculae that have most of the characteristics of newly formed bone (A) Most of the trabeculae are rather large and communicate with one another Between the bone there is a loose fibrous connective tissue matrix (B) and in most of these areas there are one or more thin walled blood vessels There are a large number of osteoblasts (C) surrounding all the bone trabeculae There is no evidence of osteoclasis

BONE CYST ACC 77214



NEG 72711

NEG 73784 X150

Accession 70412

Registered by
Dr I M. Wise
Mobile, Alabama

OSTEITIS FIBROSA CYSTICA
(von Recklinghausen's Disease)

CLINICAL NOTE The patient is a colored man, 25 years of age, who three years previously noted an irregular swelling occurring in both femora, the left wrist, and left shoulder This was associated with progressive weakness and emaciation The serum calcium was 10 mg % and the blood phosphorus 2 3 mg Because of the X-ray picture an exploration of the parathyroid gland was made The left superior parathyroid measured 2 5 x 1 5 x 4 0 cm., was rather soft and homogeneous on section and contained small cystic areas

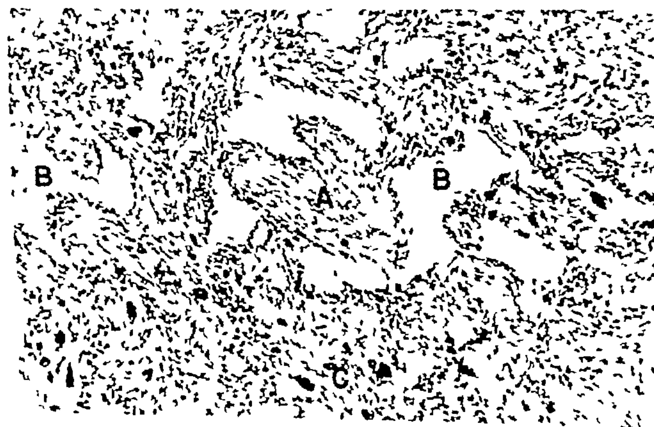
X-RAY: X-rays of the skull showed numerous areas of rarefaction that have the characteristics of cysts A similar lesion is seen in the pelvis and the heads of both femora There are also large multilocular cysts about the head of the ulna, the upper part of the humerus and also in the ribs

PATHOLOGY A section through one of the cystic areas shows a considerable amount of fibrous connective tissue (A) that is very cellular in some areas and forms a loose matrix in others There are a large number of multinucleated giant cells in the section There are scattered pink staining, homogeneous, non-laminated bony trabeculae (B) throughout the fibrous tissue (C) They are surrounded by large numbers of osteoblasts At the periphery of the section there are several larger bony trabeculae about which there are numerous osteoclasts There are several cyst-like spaces to be seen as well as a considerable amount of hemorrhage Death occurred about 5 years after the onset of symptoms There were areas of necrosis and large amounts of precipitated calcium in the heart There was a fairly extensive chronic nephritis with depositions of calcium.

Slide No 24

OSTEITIS FIBROSA CYSTICA ACC 70412





NEG ?0860 NEG 73776 X150

Accession 31335

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OSTEITIS FIBROSA CYSTICA
(von Recklinghausen's Disease)

CLINICAL NOTE The patient is a woman 29 years of age who noted severe pain in the middle of the right forearm while mopping a table There was multiple involvement of the long bones and ribs on X-ray examination No evidence of a primary focus was seen One week before death she fell and sustained a fracture of the left humerus and both femora There was no Bence-Jones protein in the urine

X-RAY: Examination of the pelvis and both femora showed numerous mottled areas of decalcification as well as fractures of both femora X-ray of the right humerus revealed demineralization of the entire bone and a fracture in the upper third

PATHOLOGY On microscopic examination of the tissue from the leg there is a considerable amount of hemorrhage dispersed throughout the fibrous tissue (A) There are several cystically dilated spaces lined by endothelium (B) in the fibrous connective tissue and several spicules of calcified bone (C) that have apparently undergone degeneration In a few areas about these spicules there are several large osteoclasts (D), although this is not a conspicuous feature of the sections A moderate amount of bone marrow is present

Reference: Hyperparathyroidism, Jaffe, H L Bull N Y Acad Med 16: 291, 1940

Slide No 25

OSTEITIS FIBROSA CYSTICA ACC 31335

A

B

C

D

NEG 47935 NEG 47910 X205

Accession 85895

Registered by
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Washington, D C

FIBROUS DYSPLASIA OF BONE

CLINICAL NOTE The patient is a white male 47 years of age who had had repeated attacks of rheumatism for twenty five years These required hospitalization He was admitted in July 1942 with a swollen index finger and a diagnosis of gout was made Routine X-rays of several bones were taken and an area of rarefaction in the right ilium was found The blood phosphatase and phosphorus were normal, blood calcium was 14 mg % and the Kahn test was negative A biopsy of the ilium was made

X-RAY There is an area of rarefaction in the right ilium just above the acetabulum measuring 5 x 7 cm. This area was surrounded by a zone of increased density There is also a smaller area of rarefaction in the greater trochanter

PATHOLOGY The gross specimen consists of several pieces of soft bony tissue It is apparently a tumor, is grey-white and yellow-orange in color, and attached to an occasional spicule of bone

The sections show the tumor to consist of a loose fibrillar ground substance varying from a myxomatous type to collagenized connective tissue (A) The tissue contains scattered cells ranging in shape from oval to triangular to spindle These cells have oblong vesicular nuclei When cut cross-wise the nuclei are round In addition there are a few lymphocytes and here and there conspicuous clusters of foam cells In some of the sections the cells situated at the periphery of the tissue are hyperchromatic in other sections the fibrous tissue fades into adipose tissue All of the sections have blood vessels lined by a single layer of cells There are several small areas of recent hemorrhage No hemosiderin pigmentation is noted Within the ground substance there are small islands and trabeculae of bone The bony trabeculae are irregularly dispersed with no regular pattern Some of the islands have amorphous basophilic staining material apparently representing calcium (B) One of the sections has been decalcified In this section there are two pieces of tissue At one margin of both of the pieces there are bony trabeculae The remainder of the pieces consists of tissue similar to that described above A few of the marrow spaces exhibit evidence of hematopoiesis the remainder are occupied by fibrous tissue

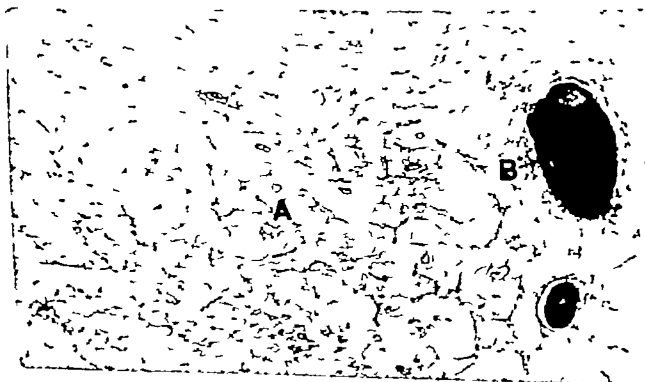
References: 1 Albright, F , Butler, A M , Hampton, A O & Smith, P Syndrome Characterized by Osteitis Fibrosa Disseminata New England J Med 216: 727, 1937

2 Lichtenstein, L & Jaffe, H L Fibrous Dysplasia of Bone Arch Path 33 777, 1942

3 Falconer, M A , Cope, C L and Robb-Smith, A H T Fibrous Dysplasia of Bone with Endocrine Disorders and Cutaneous Pigmentation (Albright's Disease) Quart J Med 11 121, 1942

FIBROUS DYSPLASIA OF BONE   ACC 85895





NEG 73955   NEG 73807 X100

Accession 61096

Registered by
Dr Charles F Geschickter
Baltimore, Maryland

PAGET'S DISEASE OF BONE

CLINICAL NOTE: The patient is a white male, 52 years of age, who has had pain in his right leg for ten years following an injury There has been swelling for seven years Two months ago he fell and fractured his right leg The X-ray shows bowing of the tibia and a pathologic fracture through a thickened and rarefied cortex A clinical diagnosis of sarcoma was made An exploratory operation was performed and the leg amputated The patient is well fifteen years later

X-RAY: X-ray from A M M Accession 81915 There is considerable increase in density over the entire right half of the pelvic bone and about the region of the hip joint

PATHOLOGY: The section is composed of large bony trabeculae (A) For the most part they are arranged in such a way that the laminations have somewhat the appearance of a topographic map or mosaic There are numerous cystic areas in these trabeculae The interosseous tissue is mostly loose fibrous connective tissue (B) and contains a fairly large number of multinucleated giant cells (C) There are a few lymphocytes present and a considerable number of clear endothelial lined spaces

Reference The Pathology of Osteitis deformans Paget's disease
Cone, S M , Jour Bone and Joint Surgery, 4 751, 1922

Slide No 27

PAGET'S DISEASE OF BONE   ACC 61096



NEG 73194   NEG 73827 X150

CLASSIFICATION OF TUMORS (Ewing)

GROUP I TYPE: CONNECTIVE TISSUE

(a) Fibroma, composed of connective tissue
(b) Chondroma, composed of cartilage
(c) Chordoma, composed of tissue of chorda dorsalis
(d) Osteoma, composed of bone
(e) Myxoma, composed of mucous tissue
(f) Lipoma, composed of fat tissue
(g) Angioma, composed of blood-vessels
(h) Lymphoma, composed of lymphatic tissue
(i) Sarcoma, a cellular tumor composed of anaplastic tissue of any of the above types

GROUP II TYPE: MUSCLE TISSUE MYOMA AND MYOSARCOMA

(a) Leiomyoma, composed of smooth muscle tissue
(b) Rhabdomyoma, composed of striated muscle

GROUP III TYPE THE ELEMENTS OF THE NERVOUS SYSTEM

GROUP IV TYPE ENDOTHELIUM ENDOTHELIOMA

GROUP V TYPE: EPITHELIUM, PAVEMENT OR GLANDULAR

REVISED CLASSIFICATION OF BONE TUMORS 1939 (American College of Surgeons)

	Malignant	Benign
I OSTEOGENIC SERIES	1. Osteogenic sarcoma a Medullary and subperiosteal b Telangiectatic c Sclerosing d. Periosteal e Fibrosarcoma (1) Medullary (2) Periosteal f Parosteal capsular	1 Exostosis 2 Osteoma
II CHONDROMA SERIES	1 Chondrosarcoma 2 Myxosarcoma	1 Chondroma
III GIANT CELL TUMOR SERIES	1 Malignant	1 Benign giant cell tumor 2 Epiphyseal giant cell tumor
IV ANGIOMA SERIES	1 Angio-endothelioma 2 Diffuse endothelioma	1. Cavernous angioma 2 Plexiform angioma
V MYELOMA SERIES	1 Plasma cell 2 Myelocytoma 3 Erythroblastoma 4 Lymphocytoma	
VI RETICULUM CELL LYMPHOSARCOMA		
VII LIPOSARCOMA		

Accession 58669

Registered by
Drs Hall & Thomas
Clarksburg, W Va

OSSIFYING FIBROMA

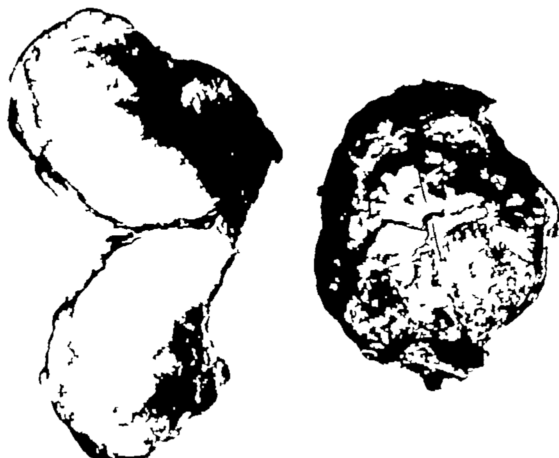
CLINICAL NOTE: A 16-year-old white male who had pain and swelling in the face for six months The X-ray showed expansile enlargement of the left antrum to three times its normal size At operation the growth was found to have destroyed by pressure necrosis the entire anterior wall and the lateral inferior and nasal walls

X-RAY: A lateral view of the wall showed a fairly circumscribed area of increased density in the lower mid portion of the antrum.

PATHOLOGY: The tumor was firm, of a grey-white color, and measured 7 5 x 3 x 4 cm. The section is composed of dense fibrous tissue (A), most of it relatively cellular It is arranged in interlacing bands with occasional round, calcareous spicules (B) embedded in its substance In the more cellular portions of the tumor the nuclei are tightly packed but tumor giant cells and other malignant features are lacking This is a more cellular ossifying fibroma than the previous case but it is a benign lesion

This case is included in the dental atlas

OSSIFYING FIBROMA ACC 58669



NEG 67309 NEG 67238 X650

Accession 55803

Registered by
Dr Lester Neuman
Washington, D C

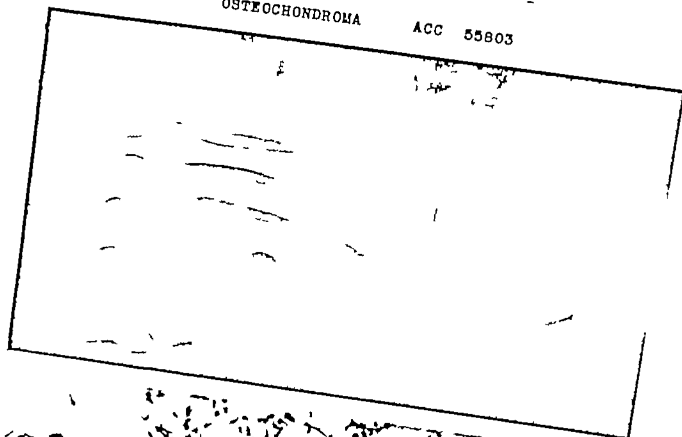
OSTEOCHONDROMA

CLINICAL NOTE: A white girl, 9 years of age, who first noticed a swelling of her left foot in September 1937 Subsequently there was a fracture of the second metatarsal bone There was no pain and the child was able to run and walk as usual A biopsy was performed A follow-up note on 11 January 1939 states that "patient is now entirely (?) well"

X-RAY There is a tumor with increased density involving both the first and second metatarsal bone of the left foot which causes considerable displacement There is a fracture between the middle and distal third of the second metatarsal bone

PATHOLOGY: The section is composed largely of dense trabeculae of bone surrounded by single rows of osteoblasts In some areas the bone has undergone degeneration with calcification (A) Between the trabeculae there are collections of fibrous connective tissue (B) At one edge of the section there is a large clump of hyaline cartilage in which the cells are irregularly arranged and there is an apparent attempt to form bone

OSTEOCHONDROMA ACC 55803



NEG 68283

NEG 73736 X205

Accession 77384

Registered by
Army Medical Museum
Washington, D C

OSTEOCHONDROMA

CLINICAL NOTE: Patient is a white male, 27 years of age He complained of pain and swelling in the left groin for a period of three months At the onset the mass was about the size of a small walnut, and gradually increased to the size of a small apple The mass caused no pain and gave no trouble except when on long marches or when lying on the abdomen On physical examination there was a firm, bone-like, non-movable mass attached to the ramus of the left pubic bone The tumor was removed and the patient made an uneventful recovery

X-RAY The X-ray showed an irregular, mottled tumor mass arising from the pubic bone and extending downward This mass is irregular in density and there is little evidence of calcification There is no evident destruction of bone

PATHOLOGY: The specimen consisted of a roughly spherical, nodular mass which weighed 76 grams The surface is smooth and for the most part composed of cartilage embedded in a bony framework On microscopic examination there are large nodules of very cellular hyaline cartilage (A), the cells are large and occur in clusters separated by a fibrous connective tissue stroma In some places the cartilage is undergoing transformation into bone (B), in others it stains a deep purple and has undergone calcification (C)

Slide No 30

OSTEOCHONDROMA ACC 77384



NEG 72502 NEG 7373 6 X125

Accession 73419

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ENCHONDROMA OF FINGER

CLINICAL NOTE Not available

X-RAY There is a cystic area involving most of the middle phalanx of the right little finger This lesion has caused slight enlargement of the phalanx However, there is definite thinning of the cortex of the bone

PATHOLOGY Transverse microscopic sections through the finger contain skin, subcutaneous tissue and muscle in addition to the bone There is considerable thinning of the bony cortex There is little dead bone and no evidence of osteoclasis The entire marrow cavity is filled with a circumscribed area of embryonic hyaline cartilage (A) which stains grey-blue in color In a few areas there is definite evidence of transition of cartilage into poorly differentiated bone (B)

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ENCHONDROMA OF FINGER ACC 73419



NEG 71789 NEG 73780 X150

Accession 14058

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GIANT CELL TUMOR OF FEMUR

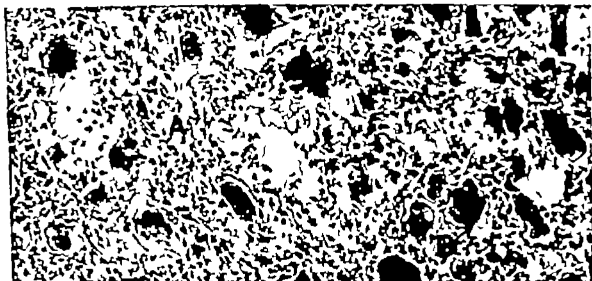
CLINICAL NOTE The patient is a colored male 27 years of age In February 1919 he noticed pain in the region of the right knee He was admitted to the hospital two months later and an arthrotomy was done A diagnosis of chronic arthritis, suppurative, cause unknown, was made The knee joint was explored again in July, the tissue examined for evidence of tuberculosis, and none was found The wound healed and the joint was partially ankylosed He was admitted to Walter Reed Hospital in October with osteomyelitis of the right femur In May 1920 there was evidence of tumor in the lateral condyle of the femur which extended upward and into the medial condyle with destruction of the cortex A diagnosis of giant cell sarcoma was made and the leg amputated

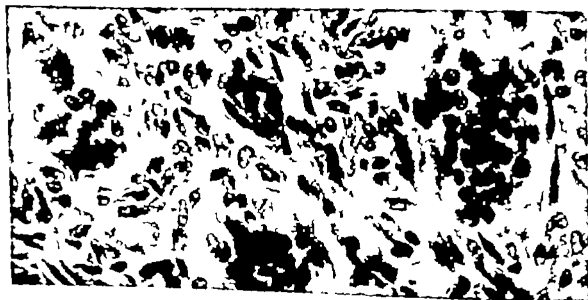
X-RAY X-ray of the right femur shows that the lateral condyle of the femur was practically entirely replaced with a tumor that was considerably less dense than the adjacent bone This tumor extends for a considerable distance up the shaft of the femur

PATHOLOGY: The tumor mass is lobulated in structure, grey-red in color, and occupies an area corresponding to that seen in the X-ray The darker areas represent blood clot On microscopic examination there is a fibrous connective tissue stroma (A) through which are scattered large numbers of giant cells (B) These cells vary considerably in size, shape and in the number of nuclei The fibrous stroma of the tumor is very cellular

GIANT CELL TUMOR OF FEMUR ACC 14058







NEG 31166 NEG 63503 X205 NEG 63505 X705

Accession 69380

Registered by
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GIANT CELL TUMOR OF BONE

CLINICAL NOTE A white man, 50 years of age, with pain, weakness, and swelling of the left knee of four months' duration These symptoms were gradually progressive On physical examination there was a painful swelling at the upper outer border of the left patella and the bony landmarks of the knee joint were obscured The tumor was excised and several masses of friable tissue containing bone fragments removed

X-RAYS Left knee In the lateral view there is an area of decreased density proximal to the medial condyle of the femur The cortex of the bone is destroyed and the lesion extends about half-way through the shaft of the bone

PATHOLOGY The section is composed for the most part of large multinucleated giant cells (A), some of which contain as many as 50 nuclei These cells compose approximately 90% of the tissue in most areas These large cells are separated from each other by a fine fibrous connective tissue stroma (B) There are a moderate number of thin-walled blood spaces (C)

Reference: Giant cell tumor of bone, Jaffe, H L , Lichtenstein, L , and Portis, R B Archives of Pathology, 30 993, 1940

Slide No 33

GIANT CELL TUMOR OF BONE ACC 69380

NEG 70250 NEG 73732 X160

Accession 51276

Registered by
Army Medical Museum
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GIANT CELL TUMOR OF FEMUR
(Malignant Clinically)

CLINICAL NOTE: Patient is a white male, 20 years of age, who was admitted to the Hospital in September, 1936 because of pain when walking in the region of his left knee for a period of about three months X-rays revealed a bone cyst and the cavity was curetted This was diagnosed as a giant cell tumor of bone It was a discharging wound for some time and movement of the joint was limited X-ray revealed increasing destruction of bone so that amputation was performed

X-RAY: This was a destructive lesion involving the entire metaphyseal region of the femur There is extensive destruction of the cortex and evidence of bony spicules through the surrounding muscle There is evidence of periosteal proliferation for a considerable distance up the shaft of the femur

PATHOLOGY: The section is composed largely of a very cellular fibrous connective tissue stroma, the cells of which vary greatly in size, shape and staining quality There are also large numbers of multinucleated giant cells that occupy about one-fourth of the entire section The number of nuclei in these cells vary considerably In some areas there are rather large vascular channels

Reference: Malignant Giant Cell Tumor of Bone F W Stewart, B L Coley, and J H Farrow, American Jour of Path XIV: 515, 1938

Slide No 34

GIANT CELL TUMOR OF FEMUR ACC 51276



NEG 65734 NEG 65597 X810

Accession 63339

Registered by
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OSTEOGENIC SARCOMA OF TIBIA
(Periosteal)

CLINICAL NOTE: The patient is a 23 year old white man He states that in May 1938 he struck his leg on a bed rail and a swelling resulted which he noticed two weeks later at the site of the bruise Four months later he was X-rayed and this showed a definite involvement of bone and the leg was amputated above the knee Shortly after this he developed a cold with pain in the right chest About two ounces of fluid were aspirated and tumor cells noted in the pleural fluid There was some improvement following X-ray therapy A diagnosis was made of osteogenic sarcoma of the right leg with metastasis to the lung In spite of X-ray therapy the metastasis continued to grow but the patient was still alive two years following amputation

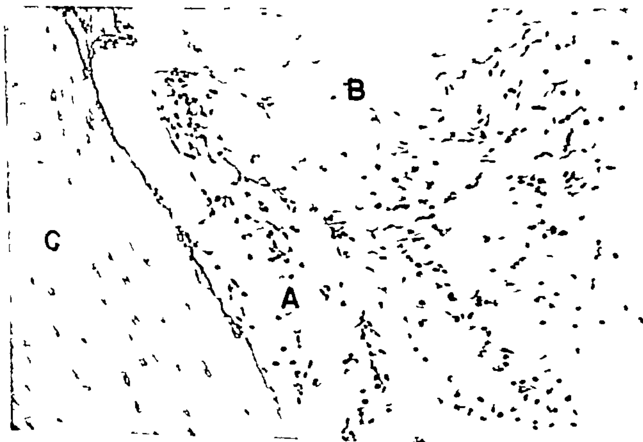
X-RAY: There is an elevated area of bone formation just beneath the tibial tubercle on the right leg This shadow shows a moderate amount of radiation at right angles to the bone cortex There is some increased density of the shaft and marrow in this region.

PATHOLOGY: The specimen consisted of the right leg in which there was a tumor growth arising from the periosteum of the tibia that almost encircled the bone This formed a fusiform swelling that extended for 14 cm along the shaft and elevated the periosteum The medulla was relatively solid and opaque The section is taken longitudinally through the tibia and overlying the periosteum. The sections show areas of embryonal type of cartilage (A), some of which are fairly well differentiated and have a hyaline type of cell structure (B) Normal cortical bone is shown at C In parts of the tumor there is extensive degeneration whereas in others there is a tendency to calcification and bone formation There are localized areas of spindle shaped cells with fairly numerous mitotic figures

Slide No 55

OSTEOGENIC SARCOMA OF TIBIA ACC 63339





NEG 70025 NEG 73773 X150

Accession 75617

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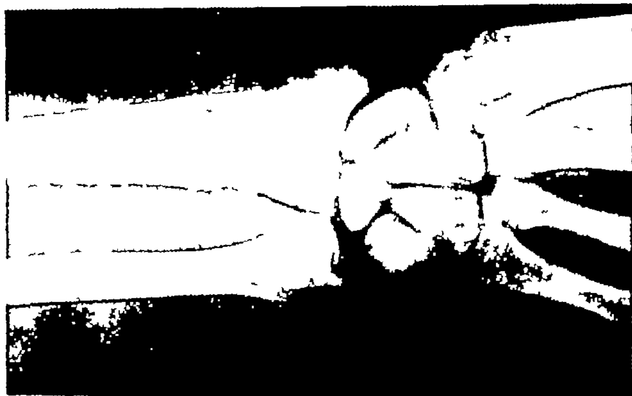
OSTEOGENIC SARCOMA OF ARM
(Recurrence)

CLINICAL NOTE: The patient is a man 22 years of age In June of 1941 he noticed pain in the right wrist There was no definite history of injury He did, however, play soft ball and stopped playing because of the pain in his wrist This is worse at night and extends as far as the shoulder During the past four weeks there has been a noticeable enlargement of the radial side of the wrist There is a uniform swelling in the lower third of the right forearm, tender on deep pressure An incision was made into the mass in an effort to resect the tumor and do a bone graft When the bone was exposed there was extensive dissemination of the tumor in the tendon sheath This was removed as far as possible following which X-ray therapy was given

X-RAY: This shows mottled areas of lessened opacity Throughout the distal end of the radius there is considerable condensation of bone in the medullary canal

PATHOLOGY: *The gross specimen consisted of the distal portion of* the radius with the articulating surface The medial surface is eroded and finely nodular Cross sections of the bone were described as of normal bony architecture Microscopic examination reveals normal eosinophilic bony trabeculae throughout which is interspersed a considerable amount of fibrous connective tissue and dense bluish staining trabeculae of fibrous bone; between the various types of bone there is a rather loose meshwork of eosinophilic material The tumor tissue shown in the photomicrograph has the appearance of a fibrosarcoma with somewhat fusiform cells (A) that vary considerably in size, shape and staining quality An occasional multinucleated giant cell (B) is present

OSTEOGENIC SARCOMA OF ARM ACC 75617



NEG 72034 NEG 73826 X280

Accession 72208

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OSTEOGENIC SARCOMA OF TIBIA

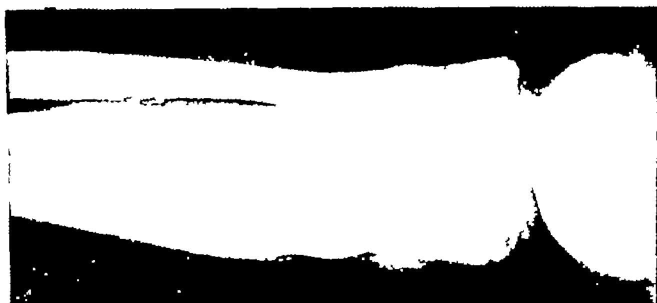
CLINICAL NOTE: White male, age 18 years In November 1940 the patient struck his left leg This was followed by pain, swelling and localized tenderness An X-ray at this time was interpreted as syphilitic periostitis The serology was negative Anti-luetic therapy was given However, the X-ray showed progressive changes and the diagnosis at that time was Ewing's sarcoma or osteitis An operation was performed and the left tibia exposed The periosteum was greatly thickened, the cortex expanded, the tumor was very granular and there was considerable increase in vascularity

X-RAY: There is an elliptical enlargement of the shaft of the upper third of the left tibia due to increase in cortical bone and new bone formation of the periosteum The outline of the medullary cavity is lost; there is no evidence of an osteolytic process

PATHOLOGY: Microscopic examination reveals a very loosely arranged stroma of fibroblasts, the majority of which have the characteristics of myxomatous cells (A) In a few areas there is a tendency for the tumor to form a more compact stroma and in other areas there is an abortive attempt to lay down hyaline cartilage (B) Scattered multinucleated cells are present but there is no evidence of mitosis in the sections

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OSTEOGENIC SARCOMA OF TIBIA ACC 72208



NEG 71235 NEG 73778 X125

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Washington, D C

Accession 54545

OSTEOGENIC CHONDROSARCOMA OF FEMUR

CLINICAL NOTE: The patient was a boy 20 years of age He first noticed a swelling of the left thigh just above the knee joint in May 1937 The swelling gradually enlarged for about three weeks and then remained stationary There was pain associated with walking The leg was amputated two months after symptoms were first noted and death occurred nine months later, at which time there was a local recurrence which extended into the pelvis There were also metastases to the lungs, heart and left kidney

X-RAY: Shows a malignant tumor that was diagnosed as osteogenic sarcoma of the left femur There is evidence of both bone production and destruction

PATHOLOGY The lower end of the femur is enlarged, a longitudinal section of which is shown in the accompanying photograph An X-ray of this specimen is shown to illustrate the relation of tumor to bone The section is composed largely of tumor, the bulk of which is composed of a cartilaginous like matrix In some areas the cartilage is relatively acellular (A), stains from pink to blue, whereas in other areas it is extremely cellular and is composed rather of myxomatous cells (B) There are large numbers of giant cells (C) In one place there is an area of tissue that has a good many of the characteristics of a fibrosarcoma However, this represents only a small part of the section The tumor is relatively avascular

Reference: Chondrosarcoma of bone Phemister, D B , Surg Gyn & Obst 50 216, 1930

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OSTEOGENIC CHONDROSARCOMA OF FEMUR ACC 54545







NEG 66186 NEG 66301 NEG 73734 X160

Accession 54412

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OSTEOGENICSARCOMA OF FEMUR

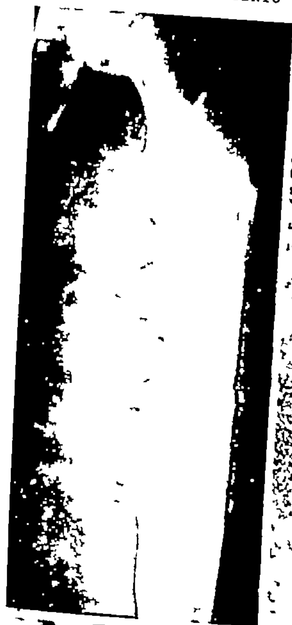
CLINICAL NOTE: Patient is a white male, 21 years of age, who noted pain and swelling of the upper left thigh and was treated for muscle strain Subsequently he developed an indurated swelling and an X-ray was reported as a probable early bone sarcoma Physical examination was negative except for the swelling of the thigh

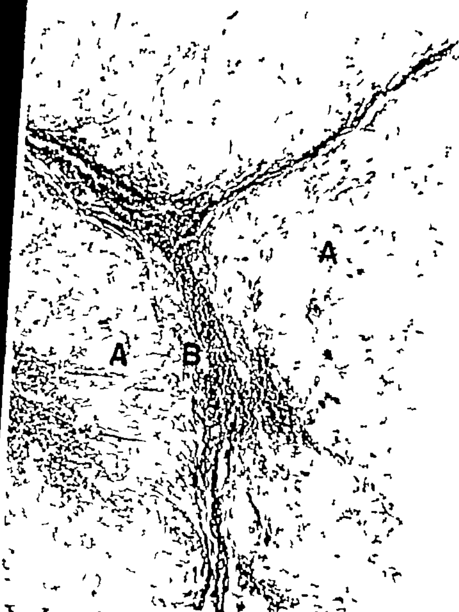
X-ray therapy was given and a biopsy of the tumor was made two months after the onset and a diagnosis of osteogenic sarcoma, chondroblastic was made Patient died about one year following the biopsy

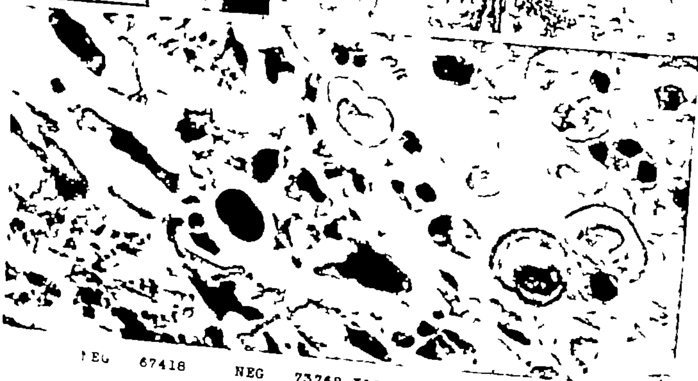
X-RAY X-ray of the left femur revealed a mass on the medial aspect which extended from the lesser trochanter for a considerable distance down the shaft There is a moderate amount of new bone formation on the lateral aspect The X-ray appearance of the mass itself shows a moderate amount of increased density with mottling The cortical bone is considerably thickened, especially the medial aspect, and the marrow cavity is practically obliterated The hip joint is not involved

PATHOLOGY The tumor had extended to the left ilium and was surrounding most of the shaft of the femur There was metastasis to both lungs and the aortic lymph nodes Section of the femur at the time of autopsy was for the most part formed of cartilaginous tissue (A) separated by a fine fibrous connective tissue stroma (B) In several areas there is fairly extensive necrosis of the tissue The cartilage cells vary considerably in size and staining quality and are scattered throughout the tissue with practically no attempt to form any regular structure A tumor nodule in the lung shows essentially the same histologic picture, although the cartilage is considerably less differentiated -

OSTEOGENIC SARCOMA OF FEMUR ACC 54412







NEG 67418 NEG 73768 X150 NEG 661

Accession 56622

Registered by
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OSTEOGENIC CHONDROMYXOSARCOMA

CLINICAL NOTE   In January 1937 a white female of 17 years noted a slight swelling and discomfort in the region of the left knee joint which gradually increased in size An X-ray showed a sclerosing process in the upper end of the left tibia An operation was performed which consisted of drilling the bone No pus was obtained The culture was sterile and the biopsy was inadequate for conclusive diagnosis Because malignancy was suspected X-ray therapy was given six months after the onset of the disease There was no improvement and a flexion deformity of the joint developed so that amputation was advised In December 1937 a wedge-shaped piece of tissue was removed from the left tibia for biopsy Histologically, examination revealed an osteogenic sarcoma and an amputation was done two days later She died 25 December 1938; an autopsy was not performed

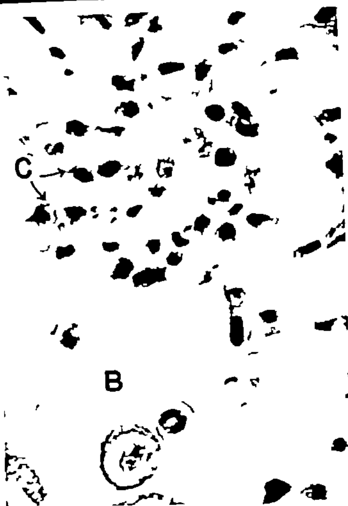
X-RAY: A lateral view of the left knee shows a roughly spheroid area of slightly increased density about the upper end of the tibia and fibula and also the popliteal space The cortical bone of the tibia is increased in density and the medulla is partially obliterated The anterior surface of the tibia is irregular in the region of the tibial tuberosity

PATHOLOGY: The knee joint of the leg was held in mid-flexion and the joint cavity contained a slight excess of clear, blood-tinged fluid The intra-articular structures were normal The tuberosity of the tibia was replaced by pale grey cartilage-like tissue the size of a walnut This tissue extends beneath the ligamentum patellae and laterally to involve the tibio-fibular articulation The tumor mass also extends between the tibia and fibula and invades the medullary canal of the tibia The tissue is composed for the most part of fibrous connective tissue (A) which appears to be forming cartilage (B) In some areas the tissue is made up of a very loose stroma with a few stellate-shaped myxomatous cells (C), whereas in others the cells are more compact and resemble mature fibroblasts A few such cells have clumped together in the form of giant cells There are central cystic areas in the cartilage that contain degenerated amorphous material The clusters of cartilage are separated by bands of fairly dense fibrous connective tissue One sees an occasional spicule of dead bone throughout the section Although there are a few vascular spaces throughout the section, the tumor is for the most part avascular

OSTEOGENIC CHONDROMYXOSARCOMA ACC 56622







NEG 66756 NEG 66706 X170 NEG 66704 X705

Accession 16723

Registered by
Army Medical Museum
Washington, D C

MULTIPLE MYELOMA

CLINICAL NOTE: A white male, 67 years of age, fell and fractured the middle third of the left humerus He also had had pain in the upper third of the right femur He had apparently been losing weight for a period of three years prior to the accident Urine examination was negative There was no Bence Jones protein in the urine

X-RAY: X-ray of humerus shows a large regular enlargement in the shaft This area is less dense than the bone below and apparently contains scattered cystic areas An X-ray of the femur shows areas of rarefaction

PATHOLOGY At autopsy there was a large fusiform swelling of the left upper arm. The bone was fractured There was a similar swelling and fracture at the level of the great trochanter of the right femur All the ribs were soft They cut more readily than cartilage and could be fractured with ease The sternum and vertebrae were of similar consistency A section of the sternum shows the bulk of the marrow to be composed of uniform mononuclear cells of the myeloid series On microscopic examination the cellular structure is fairly uniform. The cells are irregular in size and shape and for the most part the nuclei stain deeply with the hematoxylin dye A considerable number of cells have nuclei eccentrically placed so that they resemble plasma cells Mitotic figures are rare

Slide No 41

MULTIPLE MYELOMA ACC 16723



NEG 32146 NEG 60366 X1000

Accession 73255

Registered by
Army Medical Museum
Washington, D C

EWING'S TUMOR OF FEMUR
(To illustrate effect of radiation therapy)

CLINICAL NOTE: The patient is a white male, 19 years of age His knee was injured in August 1940 while playing football and there was pain for several hours without swelling or disability Two months later he had a similar accident In November the left knee was bumped and locked and the patient was hospitalized for a few days Pain and swelling reappeared, In January 1941 he reported at the Station Hospital and exercise was advised The patient was hospitalized two months later because of swelling and pain in the leg A biopsy was taken at this time and a diagnosis of Ewing's tumor made No special treatment was given other than bed rest and the application of a plaster cast Following radiologic examination the patient received extensive X-ray therapy over a period of 18 days and one month later the leg was amputated A follow-up note on 22 October 1942 stated that the patient was in good condition and showed no evidence of recurrence of the tumor

X-RAY: An X-ray of the lower third of the left femur showed rather widespread osteolysis Most of the destruction is on the lateral aspect of the leg, and there is considerable erosion of the periosteum. On the medial aspect there is a very definite elevation of the periosteum.

NOTE: A section from a rather typical case of Ewing's tumor, A M M Acc 69888, is included to show a *fairly* typical picture of such a tumor Neg 73775 is a representative field

PATHOLOGY: The bone on the distal end of the femur is enlarged and softened The bone marrow is filled by soft whitish material This extends into the cortex There is no invasion into the joint itself Several inguinal lymph nodes are apparently normal The section is composed largely of bone and fibrous connective tissue stroma Some of the bony spicules are undergoing osteoclasis In several areas throughout the softened tissue there are pink staining areas of necrosis It is assumed that these necrotic areas represent tissue that corresponded to tumor prior to X-ray therapy

Slide No 42 & 43

EWING'S TUMOR OF FEMUR ACC 73255







NEG 71830 NEG 73781 X125 NEG 73775 X160

Accession 77351

Registered by
Army Medical Museum
Washington, D C

METASTATIC BREAST CARCINOMA IN BONE

CLINICAL NOTE: The patient is a white female, 65 years of age A scirrhus carcinoma of the right breast was removed in 1935 The patient was well for three years when she began to have pain in her right hip This was accentuated by a fall and she was treated as a case of arthritis She became progressively worse and X-rays revealed findings consistent with metastatic carcinoma of the bone The disease gradually progressed and she died six years after the original operation.

X-RAY X-ray of the right foot shows extensive demineralization of all bones There are irregular areas of increased density in the tibia, fibula, os calcis, and cuneiform. There is considerable calcification of the arteries Similar changes were seen in practically all the bones of the body Such metastases usually occur in the long bones and vertebrae It is unusual to find them in the small bones of the hands and feet

PATHOLOGY: At autopsy there were extensive metastases in practically every bone A section through a vertebra shows the entire cancellous bone to be extensively infiltrated between bony spicules with a typical adenocarcinoma There is little stroma associated with this tumor Such a tumor would be consistent with a primary carcinoma in the breast The bone marrow spaces have been almost entirely replaced with tumor tissue (A) The bony trabeculae show beginning degeneration (B)

Reference: Willis, R A The Spread of Tumors in the Human Body London, J & A Churchill, 1933 550p

Slide No 44

METASTATIC BREAST CARCINOMA IN BONE ACC 77351

NEG 72515 NEG 73786 X160

Accession 41642

Registered by
Dr Leffler,
Gallinger Hospital
Washington, D C

CARCINOMA OF THE LUNG
(Metastases to the Femur)

CLINICAL NOTE: A white male 35 years of age, had noted pain and swelling in the left knee for a period of six months He had a cough for about two months and had lost 31 pounds over a six months period The right thumb had been amputated because of pain While in the hospital, the knee began to swell An X-ray of the chest showed a shadow at the right apex which suggested malignancy The tumor of the leg was considered to be malignant and was amputated

X-RAY: An X-ray of the knee showed an extensive destructive process involving the distal shaft of the femur There was considerable periosteal proliferation A similar lesion with increased density was present in the upper third of the tibia.

PATHOLOGY: Throughout a section of the femur there is a very extensive invasion with a mucinous adenocarcinoma (A) This probably represents a metastatic tumor from the lung The bone trabeculae (B) are dense and in some areas very irregular in size and shape There is considerable new bone formation between the older spicules of bone

Slide No 45

CARCINOMA OF LUNG ACC 41642



NEG 60953 NEG 73765 X100

Accession 86050

Registered by
Army Medical Museum
Washington, D C

FLUORIDE POISONING

CLINICAL NOTE Patient is a white man 22 years of age who was first treated in Texas about 1937 for possible anemia He was admitted to the hospital in June, 1942 because of an infected chalazion At this time he was transferred to the Medical Service because of a severe anemia It was noted that the teeth were chalky and that these changes were consistent with chronic fluorine poisoning The part of Texas he came from was noted for the occurrence of this type of poison Urine shows 1 plus albumin Specific Gravity was fixed Urea clearance was 6 3% and there was an increase in the amount of albumin RBC 2 2 M., Hb 6 5 gms % Chemical analysis for fluorine: Sternum 0 69%, lumbar vertebra 0 75%, teeth 0 45% Specific gravity of bone was 2 19 in contrast to normal of 1 85 The patient died in coma

PATHOLOGY: Autopsy revealed a severe chronic nephritis and anemia The bone of sternum, ribs and vertebra sawed without difficulty, and the trabecular markings were unusually coarse The cortex had a somewhat white appearance; the marrow tissue was pale red
Microscopic Examination: The bone trabeculae are large and the normal architecture is granular (A) in appearance The lamellae are irregular and not well seen and there is some tendency to fragmentation. There is some condensation of the bone at the periphery of the trabeculae (B) The bone marrow shows a moderate amount of erythropoietic hyperplasia consistent with a secondary anemia

Reference: 1 Changes in teeth and bone in chronic poisoning Sutro, C J Archives of Pathology, 19: 159, 1935

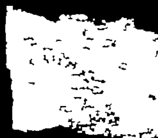
2 Histopathology of bones in chronic experimental flourine poisoning Kellner, H., Archiv f Exper Path u Pharmokol 192: 549, 1939





Sternum , this case

Sternum , normal





NEG 74194 NEG 74195 NEG 73811 X125

Registered by
Army Medical Museum
Washington, D C

Accession 79481

DEGENERATION OF CARTILAGE
(Traumatic)

CLINICAL NOTE: While starting a motorcycle the patient twisted his right leg injuring his knee There was considerable pain in the joint for one month, after which an operation was performed The semilunar cartilage was found to be torn and was removed

PATHOLOGY Microscopic examination of a piece of semilunar cartilage shows considerable evidence of degeneration. The strands of fibrous matrix (A) are widely separated and the cells (B) are irregularly arranged rather than having any definite arrangement, as is usual in hyaline cartilage There is considerable fraying of the tissue (C)

DEGENERATION OF CARTILAGE ACC 79481



NEG 73799 X200

Accession 79356

Registered by
Army Medical Museum
Washington, D C

GANGLION FROM KNEE JOINT

CLINICAL NOTE: A colored male who has had discomfort in the right knee for two weeks He felt as if something was slipping about in his knee joint

PATHOLOGY: The specimen consists of a small nodule that measures 3 x 1 5 x 1 cm. with multinucleated spaces on the cut surface The section is composed of tissue that resembles the synovial membrane of a joint The synovial cells are for the most part flat (A), but in some areas there is evidence of proliferation The cavity apparently contains fluid The subsynovial tissue (B) is composed of stellate cells and in some areas there is moderate infiltration with lymphocytes (C) There are also numerous lymphatic channels and small blood vessels (D)

Slide No 48


GANGLION FROM KNEE JOINT ACC 79356
A
B
C
D
NEG 73798 X125

Accession 61095

Registered by
Dr Chas F Geschickter
Baltimore, Maryland

LOOSE BODY IN THE KNEE JOINT

CLINICAL NOTE: The patient was a white male, 59 years of age Ten years ago he fell from a car and dislocated his right knee joint There has been associated pain and swelling at intervals About seven years ago a mass appeared below and to the right of the patella It gradually increased in size until it interfered with the use of the joint The mass was excised and since that time the knee joint has functioned normally

X-RAY An X-ray examination showed what was characterized as two patella in the right knee joint, one above the other The lower dense area corresponded to the ossified mass

PATHOLOGY: The gross specimen consisted of an irregular ovoid mass of bony tissue that measured about 8 cm. in length and 5 cm. in diameter

The slide is composed for the most part of immature hyaline (A) cartilage In some areas cartilage is undergoing transformation into bone (B) Some of the bone trabeculae are immature and incompletely formed, while others are fully developed Between the bony spicules the tissue is composed for the most part of fat and areolar tissue (C) Throughout are scattered a moderate number of thin-walled channels containing blood and thin walled spaces that probably represent lymphatics There are a normal number of osteoblasts in the section

Reference: Phemister, D B The Causes of and Changes in Loose Bodies arising from the Articular Surface of the Joint Jour Bone and Joint Surg 6: 278, 1924

LOOSE BODY IN THE KNEE JOINT ACC 61095

Patella

C

B

A

NEG 68291 NEG 68290 NEG 73[illegible]

Accession 77961

Registered by
Army Medical Museum
Washington, D C

LOOSE BODIES IN HIP JOINT

CLINICAL NOTE: A white male, 52 years of age Following a fracture of the neck of the femur, there was absorption of bone with upward displacement of the great trochanter At operation the right hip joint was reconstructed and a plaster cast applied

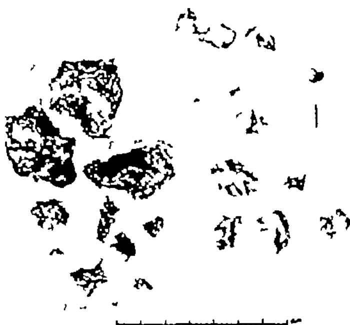
X-RAY: The right femur is displaced upward and the entire head of the bone is separated from the shaft There has been absorption of the neck and there are several calcified free pieces of bone at the site of the fracture

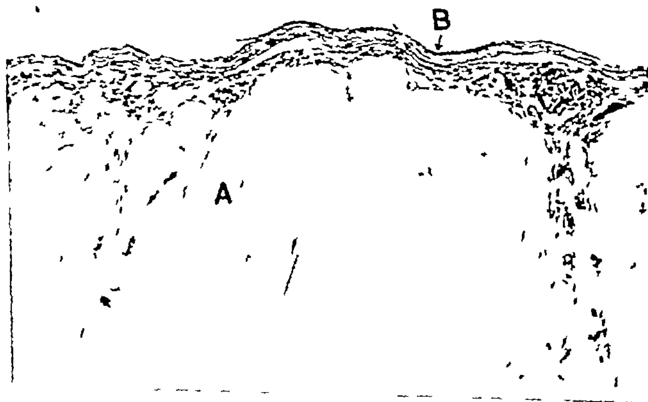
PATHOLOGY: A large number of small spherical pieces of bone were removed from the joint as well as several irregular rough areas of bone that represent the head of the femur and trochanter Microscopic examination of one of the small spherical pieces of bone shows it to be composed largely of fibrocartilage (A) throughout which are scattered a few pieces of dead bone The mass is covered for the most part by a fibrous connective tissue (B) There is no definite evidence of synovial tissue in this section

Slide No

LOOSE BODIES IN HIP JOINT ACC 77961







NEG 74134 NEG 74129 NEG 73791 X150

Accession 85411

Registered by
Army Medical Museum
Washington, D C

LOOSE BODY IN KNEE JOINT

CLINICAL NOTE Patient is a white male, 23 years of age, who twisted his knee six years previously while playing football He noticed a sharp pain in the right knee joint and immediately noted a protrusion on the other side of the joint He was seen by a physician and told that a fragment of cartilage had been broken off within the joint Symptomatic treatment was given and the patient had no further trouble for three years At this time he was a member of a tumbling team and sprained his knee again This was associated with pain for two or three days, but improved rapidly During the entire period he was conscious of a lump in the knee which could be moved by manipulation About three weeks prior to operation there was pain and aching of the knee following a prolonged period of calisthenics and marching An operation was performed and a piece of cartilaginous bone was removed through a small incision

X-RAY: In the lateral view there is an elliptical, opaque body situated in the suprapatellar space

PATHOLOGY: Specimen consists of a reniform mass 4 x 2 5 x 1 0 cm The edges are rounded and the surfaces are milky-white and smooth One surface is convex and the other surface is concave On section it appears cartilaginous with irregular calcification throughout The section is composed for the most part of hyaline cartilage (A) On the part that corresponds to the concave surface there is an area of eosinophilic bone, the structure of which is rather amorphous There are no osteoblasts in this area and t[illegible] marrow has undergone complete atrophy The cartilage in [illegible]l part of the section has undergone considerable [illegible] in many areas is calcified (C) The concave surface [illegible] of fairly normal hyaline cartilage, although there is [illegible] at regular organization This surface is smooth [illegible] covered by a thin layer of intact [illegible]al cells

LOOSE BODY IN KNEE JOINT ACC 85411



NEG 74339

NEG 74146 X100

Accession 78780

Registered by
Army Medical Museum
Washington, D C

OSTEOCHONDRITIS DISSECANS

CLINICAL NOTE: The patient is a white male 22 years of age He was admitted to the hospital complaining of pain in the left knee following twisting accident while getting out of his car one month previously There was a loose body in the knee joint and an area of rarefaction in the medial condyle of the left femur A small piece of cartilage was removed At operation there was a small defect on the medial condyle of the femur This was curetted Following operation, the patient recovered normal function of the joint and an X-ray showed the previously reported area of rarefaction to be practically obliterated He was able to walk without support or symptoms referable to the knee

X-RAY: There is a defect on the inferior medial surface of the lateral condyle of the femur designated by arrow

PATHOLOGY Specimen consists of 4 small pieces of cartilage On microscopic examination one piece shows considerable evidence of degeneration The degeneration is most conspicuous in the area that was presumably attached to the subchondral bone Relatively normal cartilage cells (A) and cells showing various degrees of degeneration (B) are present

Reference: Changes in Bones and Joints Resulting from Interruption of Circulation Phemister, D B Arch Surg 41: 436, 1940

Slide No 52

OSTEOCHONDRITIS DISSECANS ACC 78780



NEG 72728 NEG 73737 X200

CLASSIFICATION OF DISEASES INVOLVING THE JOINTS

A Infectious arthritis of proved etiology
(Microorganism to be specified)

B Probably infectious; etiology unproved
1 Arthritis of rheumatic fever
2 Rheumatoid arthritis (atrophic arthritis, chronic infectious arthritis)
(a) Adult type
(b) Juvenile type (Still's Disease)
(c) Ankylosing spondylitis (Marie Strumpell, ankylopoetica)
(d) Psoriatic arthritis
3 Arthritis associated with various infections

C Degenerative joint disease
1 Osteoarthritis (hypertrophic arthritis, degenerative arthritis, osteoarthrosis)
(a) Generalized
(b) Localized
1) Secondary to previous trauma (specify)
2) Secondary to structural abnormality (specify)
3) Secondary to previous infectious arthritis (specify)

D Arthritis associated with disturbance of metabolism
1 Gout
2 Arthritic manifestations of other metabolic diseases (specify)

E Arthritis of neuropathic origin
1 Secondary to tabes dorsalis
2 Secondary to syringomyelia

F. Neoplasms of joints
(Cyst; xanthoma, hemangioma, giant-celled tumors; synovioma)

G Mechanical derangements of joints
1 Traumatic arthritis
(specify nature of injury)
2 Joint disturbance secondary to abnormal postural strain

H Miscellaneous forms
1 Manifestations of systemic disease
(a) Arthritis of serum sickness
(b) Arthritis of hemophilia
(c) Intermittent hydrarthrosis
(d) Pulmonary osteoarthropathy
(e) Hysterical joints
2 Local joint disturbances
(a) Aseptic bone necrosis
1) Secondary to contusion, fracture, dislocation or air embolism
2) Of unknown etiology (Juvenile osteochondritis, Legg-Calve-Perthe's disease, Kohler's disease Freiberg's disease; Osgood-Schlatters disease)
(b) Osteochondritis dissecans
(c) Osteochondromatosis

Accession 86567

Registered by
G A Bennett, M D
Harvard Medical School
Cambridge, Mass

GONORRHEAL ARTHRITIS

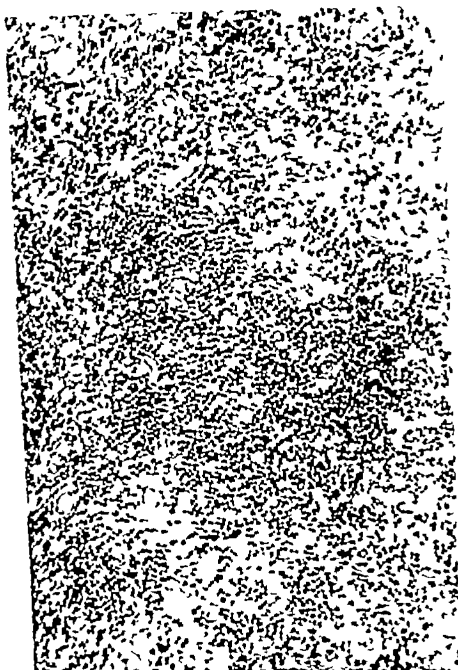
CLINICAL NOTE: The patient is a male, 37 years of age, who developed a sore knee 25 days before admission to hospital He had contracted gonorrhea 8 months previously and the urethritis subsided in approximately 3 weeks No symptoms were noted until a single joint, the knee, became painful and on examination was red, hot and swollen Purulent synovial fluid was obtained on aspiration and gonococci were grown on culture Gonococcous complement fixation test was positive The biopsy was performed 4 days after admission to hospital

PATHOLOGY: The joint surface, which is shown in the illustration, is formed by a thick layer of large pale synovial cells extensively infiltrated by neutrophils, lymphocytes and plasmocytes There is considerable formation of new capillary vascular channels The substratum, not shown in the photomicrograph, is composed of edematous fibroadipose tissue; here the inflammatory reaction is largely perivascular and the exudate of round cell type

Reference: Gonococcic Arthritis, Keefer, C S , and Spink, W W , Jour Amer Med Assoc 109: 1448, 1937

Slide No 53

GONORRHEAL ARTHRITIS ACC 86567



NEO 73808 X175

Accession 64140

Registered by
Army Medical Museum
Washington, D C

TUBERCULOSIS OF ELBOW JOINT

CLINICAL NOTE: Negro male, 18 years of age Noted a "pimple" on lateral aspect of left elbow following which the elbow joint was swollen and painful He was sent to the hospital where the left elbow joint was curetted The wound continued to drain through numerous sinuses and there was partial ankylosis of the joint A Kahn test was repeatedly positive Physical examination was negative except for the findings in the elbow

Culture of the left elbow was positive for Staphylococcus but subsequent cultures were negative Two guinea pigs were injected with material from the joint One died within a few days after injection The second pig was killed at autopsy seven weeks later and tubercle bacilli were demonstrated During the period of hospitalization the treatment was anti-syphilitic In spite of therapy the elbow continued to drain, the joint became more fixed and there was atrophy of the surrounding muscles

X-RAY: On admission there was marked narrowing of the joint space of the left elbow with irregularity in outline of the articular surfaces There was evidence of periostitis about the proximal end of the ulna and distal third of the humerus

PATHOLOGY: Several irregular fragments of soft tissue were examined The section is composed of synovial membrane, fibrous connective tissue and a small amount of muscle Most of the section is replaced with chronic inflammatory process characterized by circumscribed collections of cells arranged in the form of tubercles (A) These areas contain considerable numbers of epithelioid cells in the central part, a fairly large number of fibroblasts, a moderate number of lymphocytes and an occasional polymorphonuclear leukocyte In the center of such tubercles one sees large multinucleated giant cells (B)

Reference: Phemister, D B Changes in the Articular Surfaces in Tuberculous Arthritis J Bone & Joint Surg 7: 835, 1925

Slide No 54

TUBERCULOSIS OF ELBOW JOINT ACC 64140





NEG. 70024 NEG 73774 X150

Accession 86569

Registered by
D M. Angevine, M. D
Alfred I DuPont Institute
Wilmington, Del

SYNOVITIS IN RHEUMATOID ARTHRITIS

CLINICAL NOTE: The patient was a white man, 32 years old, who had rheumatoid arthritis during 15 years with swelling of fingers, ankles and knees The left knee had been swollen and painful for the past two years

When first seen, the left knee contained fluid and was greatly swollen There was atrophy of the thigh muscles above the knee The patient had a small subcutaneous nodule on his right ring finger The white blood cell count was 11,150 with 46 per cent mature and 22 per cent immature polymorphonuclear leukocytes, lymphocytes 26 per cent, monocytes 6 per cent The sedimentation of red blood corpuscles was constantly rapid The patient's serum agglutinated a hemolytic streptococcus at a titre of 1:1280 Synovectomy was performed on the left knee and about 50 cc of turbid serofibrinous fluid was withdrawn from the joint Subsequently the patient had been free from pain and had had much more movement of the knee The cartilaginous surfaces were tough and eroded The tissue removed from the joint consisted of synovia covered with villous projections which were intensely red and injected A considerable quantity of fibrin was adherent to the tissue

PATHOLOGY The section is composed of large numbers of villi attached to the synovial membrane The cells of the synovial lining (A) are increased in number and tend to be spheroid or spherical In the villi there are large focal accumulations of lymphocytes (B) and in some of the areas there are small blood vessels undergoing hyaline degeneration There are also fairly large numbers of polymorphonuclears throughout the section The subsynovial tissue is edematous and the areolar tissue widely separated There are focal collections of lymphocytes and plasma cells through this area

Reference: Chronic (Non-tuberculous) Arthritis, Fisher, A G T , The Macmillan Company, 1929

Slide No 55

SYNOVITIS IN RHEUMATOID ARTHRITIS ACC 86569



NEG 73944 X350

Accession 86572

Registered by
Dr G A Bennett
Harvard Medical School

SUBCUTANEOUS NODULE IN RHEUMATOID ARTHRITIS

CLINICAL NOTE The nodule was obtained from a woman 57 years of age with rheumatoid arthritis of 3 years' duration Most of the peripheral joints were swollen

PATHOLOGY: The specimen was a circumscribed nodule of yellow-grey, firm tissue that measured about 2 cm. across The cut surface was homogeneous The pathologic section is composed largely of fibrous connective tissue and the most conspicuous features are several areas of collagen (A) with varying degrees of necrosis and calcification (A1) surrounded by monocytes (B) arranged at right angles to the areas of necrosis In some places there is a tendency for these cells to form giant cells

Reference: Subcutaneous Nodules of Rheumatoid Arthritis and Rheumatic Fever G A Bennett, J W Zeller and Walter Bauer Archives of Pathology, 30: 70, 1940

Slide No 56

SUBCUTANEOUS NODULE IN RHEUMATOID ARTHRITIS ACC 86572



NEG 73941 X200

Accession 86571

Registered by
D Murray Angevine, M D
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Wilmington, Del

RHEUMATOID ARTHRITIS OF KNEE
(Still's Disease)

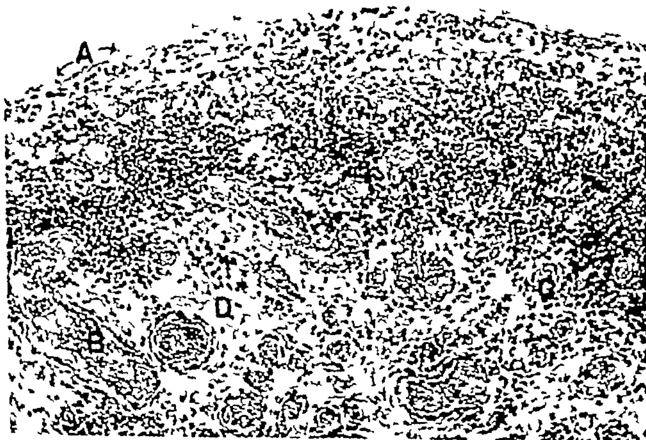
CLINICAL NOTE: The patient was a white girl 12 years of age In the Fall of 1939 her right knee became swollen and painful This subsided and recurred a year later In December of 1940 the same joint became swollen as well as both ankles, and several fingers She was admitted to the New York Hospital in January, 1941 and discharged 5 months later unimproved and gradually becoming worse A biopsy was done of the left knee joint

PATHOLOGY: The synovial lining was edematous and injected Microscopic examination shows considerable proliferation of the lining synovial cells (A); the blood vessels (B) are unusually numerous and over-filled with blood Polymorphonuclears are fairly abundant in a few areas just below the synovial lining, but for the most part the inflammatory exudate is composed of mononuclear cells, chiefly lymphocytes (C) and plasma cells There is a tendency for these to be deposited as focal accumulations The areolar tissue (D) is widely separated by edema There is endothelial proliferation and moderate thickening of the walls of several of the larger arterioles

Reference: Angevine, D M Rheumatoid Arthritis in Children New Int Clinics 1: 582, 1942, Lippincott, Phila

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RHEUMATOID ARTHRITIS OF KNEE ACC 86571



NEG 74148 X165

Accession 86568

Registered by
Dr G A Bennett
Harvard Medical School
Cambridge, Mass

OSTEOARTHRITIS OF FEMUR

CLINICAL NOTE A male, age 58 years, who entered the hospital complaining of low back pain of 8 weeks' duration The majority of articular changes were considered to be those of osteoarthritis This patient also had acromegaly

PATHOLOGY The section taken through one of the femoral condyles shows an extensive lipping There is also degeneration of the hyaline cartilage with extensive fraying or fibrillation (A) In some areas there is some condensation of bone (B) The bone trabeculae (C) are dense and the bone marrow is atrophic

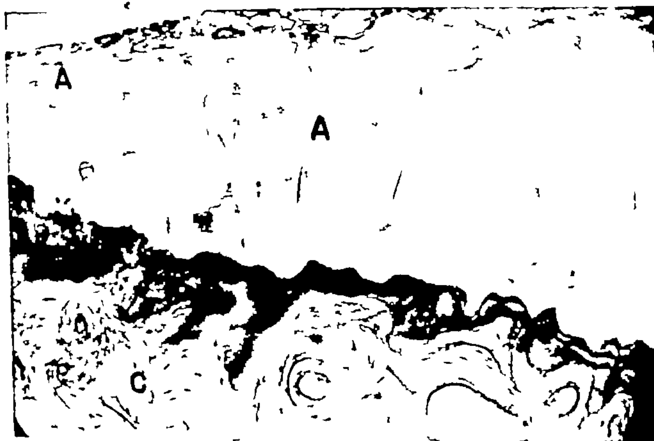
References:
1 Bauer, W & Bennett, G A Experimental and Pathological Studies in the Degenerative Type of Arthritis J Bone & Joint Surg 18: 1, 1936

2 Callender, G R & Kelser, R A. Degenerative Arthritis Am J Path 14: 253, 1938

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OSTEOARTHRITIS OF FEMUR ACC 86568



NEG 73809 X100

Accession 83942

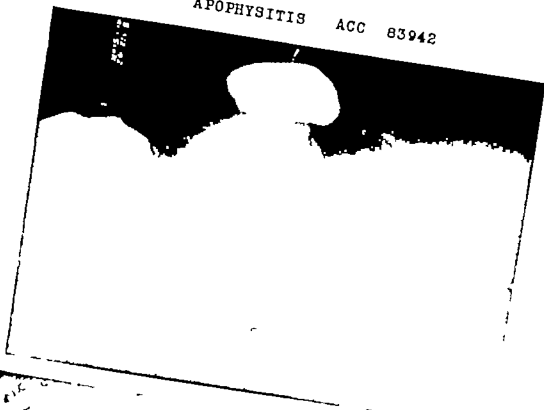
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Army Medical Museum
Washington, D C

APOPHYSITIS
(Osgood-Schlatter's Disease)

CLINICAL NOTE Patient is a colored male, 18 years of age, who noted pain below both patellae while on maneuvers He was in a cavalry troop and the pain was aggravated by movement He was hospitalized for one month and returned to duty improved A recurrence of pain brought him back to the hospital An operation was performed and the tubercles removed The patient felt that his condition was unchanged after the operation

X-RAY: The picture in both knees is very similar Both tibial tuberosities are ununited and fragmented with a suggestion of soft tissue swelling about them

PATHOLOGY The gross specimen consists of two small pieces of bone Both pieces are similar in that they show the formation of cancellous bone covered by cortical bone The bone trabeculae are seperated by fibrous connective tissue throughout which are scattered cystic areas There is a small zone of osteoid about the bony trabeculae There is considerable fibrillation of the cartilage, as well as early extensive fraying of the fibrils There are scattered areas of fat containing marrow throughout the sections There is no evidence of bone destruction and the bone is apparently being formed from cartilage by endochondral ossification The photomicrograph shows bone (A) and fibrocartilage (B)

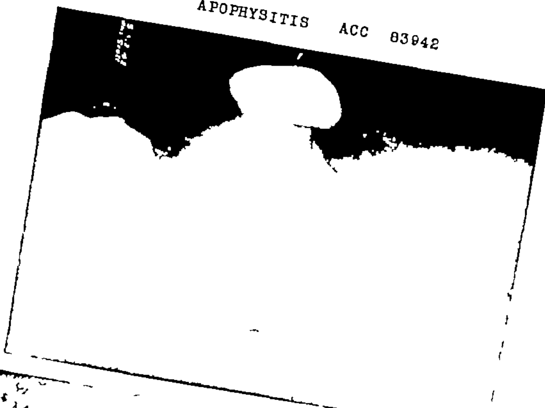


A

B

NEG 74131

NEG 73823 X150



APOPHYSITIS ACC 83942

A

B

NEG 74131

NEG 73823 X150

Accession 60073

Registered by
Dr O G Aronstein
Washington, D C

SYNOVIOMA - MALIGNANT

CLINICAL NOTE: White female, 22 years of age, with tumor developing in the region of the left ankle Two and one-half years before admission to the hospital she fell striking her left ankle A slight swelling, which was not particularly painful at first, developed several months later and at the end of two years it had increased noticeably in size There was a soft cystic swelling below the internal malleolus and extending to the plantar surface of the foot along the longitudinal arch The area over the tumor was exquisitely tender The tumor was excised; it was described by the operator as being well encapsulated and extremely vascular There was no contact with any bony structure Following operation, the patient received radiation therapy On examination 18 months later, she appeared in excellent health and there was no evidence of local recurrence Soon thereafter, however, the tumor recurred and was excised A second recurrence took place 4 years following the operation, again necessitating operation This case exemplifies the essential malignancy of synoviomas

X-RAY: Roentgenograms were negative for any bone involvement

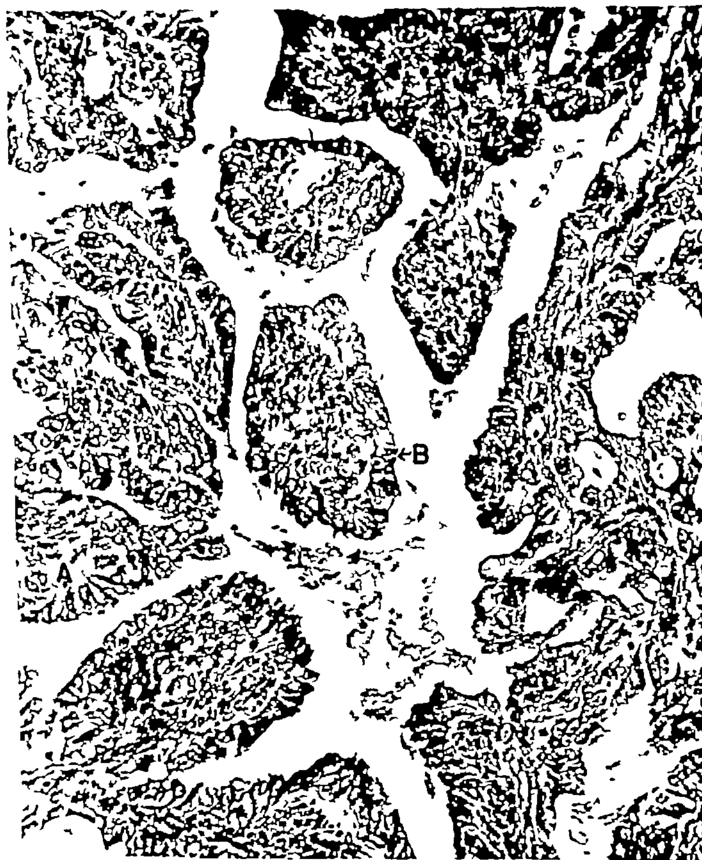
PATHOLOGY: A highly vascular tumor which shows the typical papillary pattern These papillae have a framework of elongated fibroblasts (A) and are covered by cells which closely resemble columnar epithelium (B) In some fields the line of demarcation between these two types of cells is striking, but more commonly there is no line of division Mitotic figures are not prominent in this tumor

Reference: Malignant tumors of synovial origin, C D Briggs, Ann of Surg 115: 413, 1942

Synovial Sarcoma, L C Knox, Am. Jour of Cancer, 28: 461, 1936

Slide No 60

SYNOVIOMA - MALIGNANT ACC 60073



NEG 69478 X350

Accession 80515

Registered by
Army Medical Museum
Washington, D C

AVULSION OF QUADRICEPS TENDON

CLINICAL NOTE: Patient is a white male, 43 years of age He slipped on the ice and fell immediately following which there was pain, swelling and limited motion of the left knee joint The patient was picked up, taken home and heat applied to the joint for about one week There was no improvement He was admitted to the hospital and on physical examination there was considerable swelling of the joint and a small firm mass just above it When the extensor thigh muscles were contracted there was still some movement of the patella It was assumed that the quadriceps muscle probably was torn from the patellar insertion X-ray examination revealed no evidence of bone injury above the joint An operation was done and it was found that the quadriceps tendon had ruptured about 1 cm proximal to its patellar attachment The tendon and patella were brought into apposition with chromic catgut and stainless steel wire

PATHOLOGY: The specimen consists of a mass of hyaline fibrous tissue which shows evidence of hemorrhage On microscopic examination the strands of the tendon (A) are separated in many areas and between points of separation there is considerable evidence of hemorrhage (B) Between the bundles of denser tissues there is a considerable production of new fibrous connective tissue, characterized by fibroblasts and small vascular channels In these areas there is a moderate infiltration with lymphocytes and an occasional polymorphonuclear leukocyte

Slide No 61

AVULSION OF QUADRICEPS TENDON ACC 80515



NEG 73730 X100

Accession 80515

Registered by
Army Medical Museum
Washington, D C

AVULSION OF QUADRICEPS TENDON

CLINICAL NOTE: Patient is a white male, 43 years of age He slipped on the ice and fell immediately following which there was pain, swelling and limited motion of the left knee joint The patient was picked up, taken home and heat applied to the joint for about one week There was no improvement He was admitted to the hospital and on physical examination there was considerable swelling of the joint and a small firm mass just above it When the extensor thigh muscles were contracted there was still some movement of the patella It was assumed that the quadriceps muscle probably was torn from the patellar insertion. X-ray examination revealed no evidence of bone injury above the joint An operation was done and it was found that the quadriceps tendon had ruptured about 1 cm proximal to its patellar attachment The tendon and patella were brought into apposition with chromic catgut and stainless steel wire

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Slide No 61

AVULSION OF QUADRICEPS TENDON ACC 80515



NEG 73730 X100

Accession 84169

Registered by
Army Medical Museum
Washington, D C

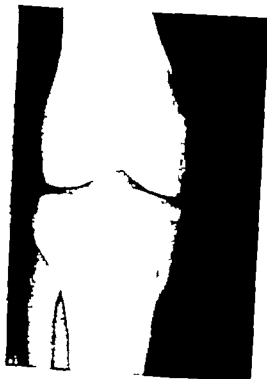
CALCIFICATION OF LIGAMENT OF KNEE JOINT

CLINICAL NOTE: The patient is a colored man 24 years of age In August 1941 he injured his right knee playing baseball and was in bed for 2 weeks The joint was stiff for 2 months Since then there has been pain in the medial aspect of the right knee, especially following standing or walking There is slight tenderness of the medial condyle of the femur Motion is good in all directions

X-RAY: There is partial calcification of the medial collateral ligament with spur formation from the femoral condyle

PATHOLOGY The mass was removed and the specimen consists of a flake of cortical bone 2 5 cm across attached to fibrous connective tissue There is a fragment 25 mm. in length and 6 mm. across which is calcified On microscopic examination most of the tendon has been replaced by trabeculae of bone so that one sees ligament attached to the bone In some areas there is fairly extensive calcification in the ligament itself A photomicrograph shows bone (A) and ligament (B) from a similar case, A M.M Acc 83920

CALCIFICATION OF LIGAMENT OF KNEE JOINT ACC 84169





B

A

NEG 73952 NEG 74143 X100

Accession 79208

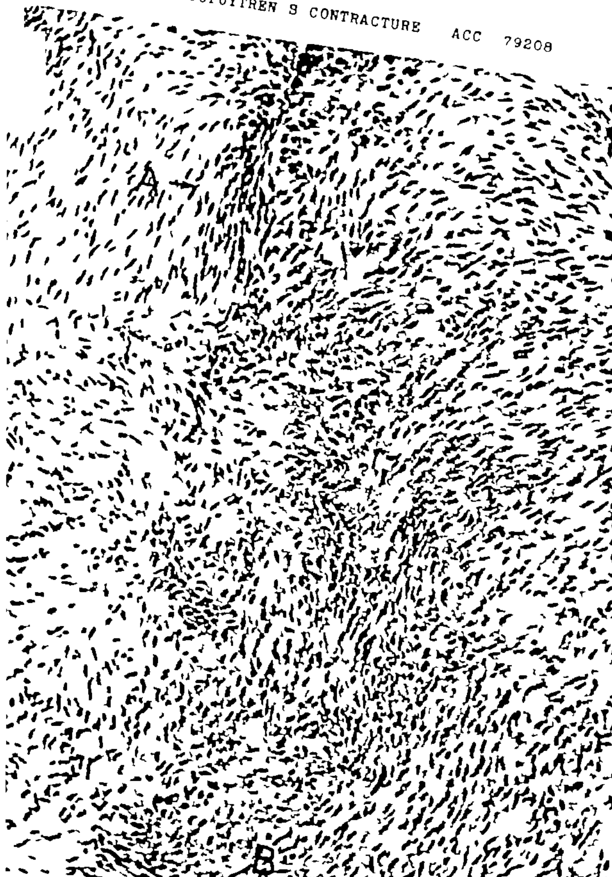
Registered by
Army Medical Museum
Washington, D C

DUPUYTREN'S CONTRACTURE
(Palmar fascia)

CLINICAL NOTE Patient is a white male, 31 years of age, who had had painful nodules in the palms of both hands of two years' duration The palmar fascia was removed from the left hand

PATHOLOGY: The specimen consists of two small, firm grey-white nodules that measure about 2 cm across Microscopic examination reveals tissue composed of closely packed spindle cells (A) arranged in bundles The nuclei are small and the stroma is fibrillar and lightly stained Between the bundles there is moderately dense fibrous connective tissue There are numerous small blood spaces (B) in the section as well as a scattering of lymphocytes and plasma cells about the vessels A few sweat glands and Pacinian corpuscles are present There is no evidence of malignancy

Slide No 63


DUPUYTREN S CONTRACTURE ACC 79208
A
B

Accession 59410

Registered by
Dr H H Van Horn
Harrisburg, Pa

FIBROMA OF TENDON SHEATH
(Xanthoma)

CLINICAL NOTE: White female, 81 years of age About 8 years ago the patient noticed a swelling of the left index finger, which later became painful The swelling became progressively larger, but the pain did not increase in proportion to the swelling She has had arthritis for the past ten years and thinks these "cysts" in the finger followed the arthritis Surgical operation was performed on finger which was tender and swollen under the middle and distal phalanges Four light colored masses of tissue were removed from under the tendons

PATHOLOGY: These masses were rough on the outside and unencapsulated The largest mass, in which there were two nodules, measured 2 x 1 x 1 cm. On section these masses are unencapsulated, solid, and the surface is distinctly brownish yellow The sections show proliferation of fibrous tissue (A), giant cells, and areas of clear cells with foamy cytoplasm (B), the whole appearance being typical of xanthoma

(In view of the history of arthritis it is possible that this mass may have started as a subcutaneous nodule However, it has none of the characteristic fibrinoid degeneration with adjacent palisading of large mononuclear leukocytes)

Reference: Ragins, Alex B , and Shively, Franklin L , Jr Ann Surg 109 632, 1939

Slide No 64

FIBROMA OF TENDON SHEATH ACC 59410



NEG 73770 X150

Accession 75636

Registered by
Army Medical Museum
Washington, D C

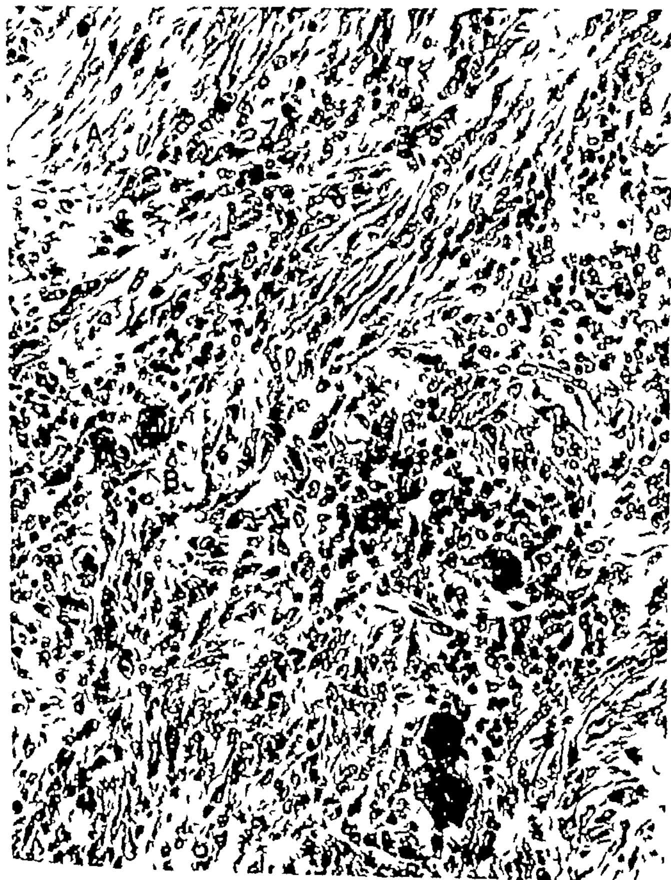
BENIGN GIANT CELL TUMOR OF TENDON SHEATH

CLINICAL NOTE: The patient is a white man 42 years of age who had a swelling in the palm of his right hand for the past 5 years Pain and tenderness developed during the past month A tumor was excised

PATHOLOGY A yellowish nodule measuring 2 x 1 x 0 5 cm. was examined The predominant feature of the histologic sections was a fairly dense fibrous connective tissue stroma (A) throughout which are encountered clusters of very large vacuolated cells with small spherical nuclei There are numerous lymphatic spaces throughout the sections In some areas the tumor is more cellular than others and in these areas there are clusters of large multinucleated giant cells (B)

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BENIGN GIANT CELL TUMOR OF TENDON SHEATH ACC 75636



NEG 73825 X425

Accession 85361

Registered by
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BENIGN GIANT CELL TUMOR OF TENDON SHEATH

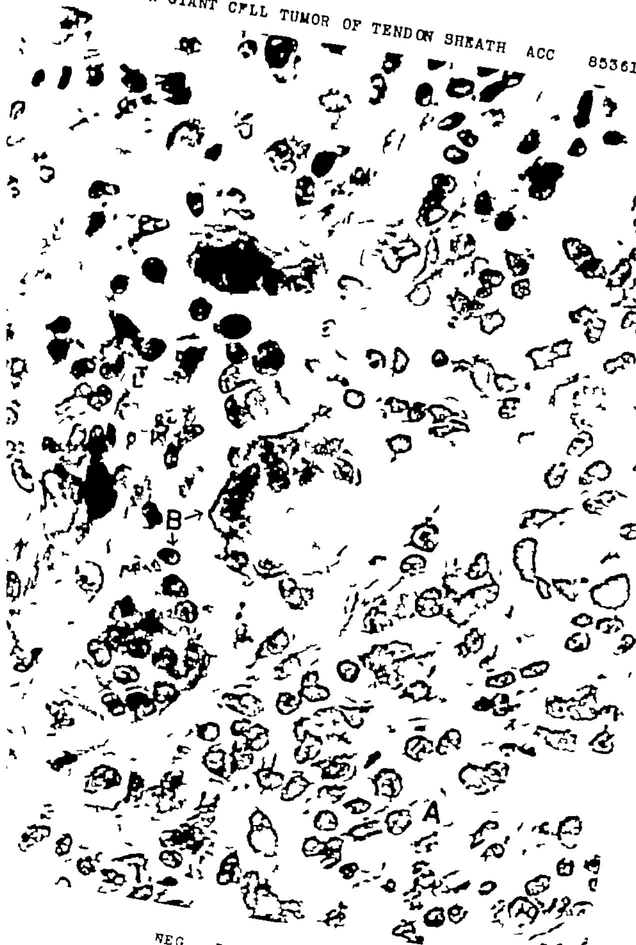
CLINICAL NOTE The patient is a white male 20 years of age; three years ago following an injury he noted a swelling in the palm of his hand near the base of the index finger

PATHOLOGY: Specimen consisted of a tumor removed from the region of the sheath of the tendon to the index finger Microscopic examination of the tissue reveals cellular areas of tissue composed for the most part of fibroblasts (A) and multinucleated giant cells (B) These areas are separated by dense bands of fibrous connective tissue In some areas the neoplastic tissue is quite cellular and apparently compact The cells vary considerably in size, shape and staining quality The predominant cell has a vesicular nucleus, although a fairly large number of cells, resembling plasma cells but with a denser nucleus, are present In some areas the tumor is not so cellular and the stroma is much more loosely arranged The cells are more irregular and in these areas the tumor has many of the characteristics of malignancy In spite of these malignant features, the tumor usually follows a benign course In this particular section one gains the impression that the tumor may not have been completely removed

Reference: Ragins, A B & Shively, F L Further Observations on Benign Tumors of the Tendon Sheath Ann Surg 109: 632, 1939

Slide No 66

BENIGN GIANT CELL TUMOR OF TENDON SHEATH ACC 85361



NEG 73805 X915

Accession 85361

Registered by
Army Medical Museum
Washington, D C

BENIGN GIANT CELL TUMOR OF TENDON SHEATH

CLINICAL NOTE: The patient is a white male 20 years of age; three years ago following an injury he noted a swelling in the palm of his hand near the base of the index finger

PATHOLOGY: Specimen consisted of a tumor removed from the region of the sheath of the tendon to the index finger Microscopic examination of the tissue reveals cellular areas of tissue composed for the most part of fibroblasts (A) and multinucleated giant cells (B) These areas are separated by dense bands of fibrous connective tissue In some areas the neoplastic tissue is quite cellular and apparently compact The cells vary considerably in size, shape and staining quality The predominant cell has a vesicular nucleus, although a fairly large number of cells, resembling plasma cells but with a denser nucleus, are present In some areas the tumor is not so cellular and the stroma is much more loosely arranged The cells are more irregular and in these areas the tumor has many of the characteristics of malignancy In spite of these malignant features, the tumor usually follows a benign course In this particular section one gains the impression that the tumor may not have been completely removed

Reference: Ragins, A B & Shively, F L Further Observations on Benign Tumors of the Tendon Sheath Ann Surg 109: 632, 1939

Slide No 66

BENIGN GIANT CELL TUMOR OF TENDON SHEATH ACC 85361



NEG 73805 X915

Accession 77638

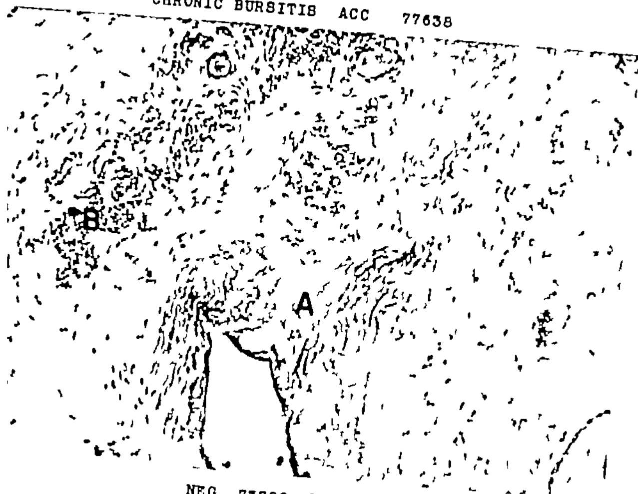
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Washington, D C

CHRONIC BURSITIS

CLINICAL NOTE The patient, a white male 23 years of age, had pain, swelling and redness over the 5th tarsometarsal joint for several months This was aggravated following a hike

PATHOLOGY: The section is composed of lining synovial membrane that stains poorly and shows considerable evidence of degeneration in places (A) In the subsynovial tissue the blood vessels are dilated and there is infiltration by a number of plasma cells, lymphocytes and an occasional polymorphonuclear leukocyte (B)

Slide No 67


CHRONIC BURSITIS ACC 77638
B
A
NEG 73789 X125

Accession 80385

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CHRONIC BURSITIS OF HEEL

CLINICAL NOTE: Patient is a white female, 27 years of age Patient first noted swelling on heel in 1936 that was the result of wearing high-heeled shoes which slipped on her feet There was no history of trauma and although pain was present while the swelling was developing, there has been none recently

PATHOLOGY: The specimen was composed largely of thick fibrous tissue with a central space lined with smooth white tissue On microscopic examination there is a dense fibrous connective tissue membrane throughout which are scattered a moderate number of lymphocytes and monocytes In scattered areas throughout the wall there are areas in which the collagen has undergone extensive degeneration (A) and in such areas there is a more intense inflammatory reaction than elsewhere There are a considerable number of small blood vessels and about many of them are collections of lymphocytes The cellular lining of the bursa has disappeared in most areas and contains amorphous eosinophilic debris that represents degenerated collagen or inspissated synovial fluid In a few areas the synovial lining cells are swollen and vacuolated (B) and a few appear as multinucleated giant cells

Slide No 68

CHRONIC BURSITIS OF HEEL ACC 80385

A

B

NEG 73739 X150

Accession 75707

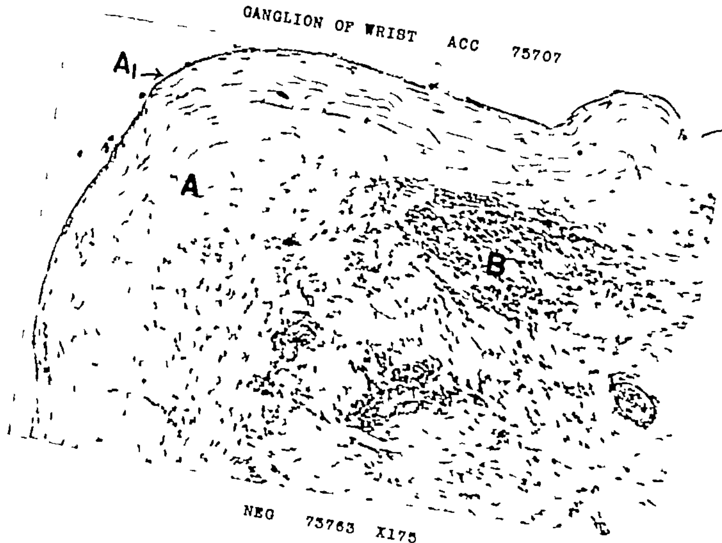
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Army Medical Museum
Washington, D C

GANGLION OF WRIST

CLINICAL NOTE: The patient is a 34 year old man who had a relatively rapid growth over the left wrist for a period of six months The clinical diagnosis of ganglion was made and it was removed surgically

PATHOLOGY: Gross examination revealed a cyst structure 2 cm. in diameter Microscopic examination revealed the wall of the ganglion to be composed of fibrous connective tissue (A) lined with flattened synovial cells (A1); throughout the wall there is a moderate infiltration with lymphocytes (B)

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GANGLION OF WRIST ACC 75707
A1
A
B
NEG 73763 X175

Accession 75782

Registered by
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Washington, D C

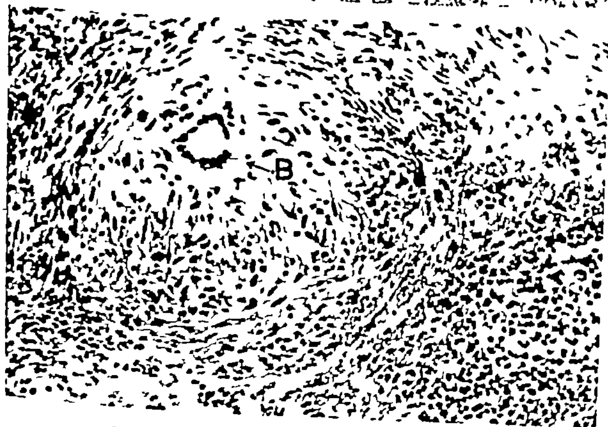
TUBERCULOSIS OF A BURSA

CLINICAL NOTE: Patient is a colored male, 24 years of age, with a tumor of the tendon sheath of the dorsum of the right hand first noted six months prior to admission It has been gradually increasing in size, measures about 2 5 inches across, and is soft and not painful

PATHOLOGY Several small pieces of tissue were examined The tissue was friable and brownish in color On microscopic examination the tissue is composed largely of synovial villi throughout which there is a fairly extensive chronic inflammatory process composed largely of lymphocytes In several areas cells composed largely of epithelioid cells and lymphocytes are clustered in the form of tubercles (A) There are a few multinucleated giant cells in the section (B)

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TUBERCULOSIS OF A BURSA ACC 75782



NEG 73793 X125 NEG 73942 X280

Accession 86350

Registered by
Army Medical Museum
Washington, D C

SYNOVIOMA OF FOOT

CLINICAL NOTE: Patient is a white woman 38 years of age with a growth on the sole of the foot between the 4th and 5th toes of two years' duration It started as a small lump beneath the skin and gradually increased until it measured 2 0 cm. across The growth was soft and compressible The tumor was removed

PATHOLOGY: The specimen measures 2 cm. across and 0 8 cm. in thickness with a fine thin capsule The tissue is grey-yellow in color

On microscopic examination the tumor is made up of coarse hyalinized fibrous septa (A) that enclose solid masses of cells (B) The cells are spindle-shaped or polyhedral, moderately basophilic with large reticular nuclei, in which a single nucleolus is often prominent The cells are uniform in size and staining quality The cells are arranged in sheets with a tendency to form concentric layers or to line irregularly shaped spaces The matrix varies from a mucinous fibrillary substance to an eosinophilic hyalin material In some places there is definite hyaline cartilage (C)

Reference: Black, W C Synovioma (Synovialoma) of the Foot Am. J Cancer, 39: 199, 1940

Slide No 71

SYNOVIOMA OF FOOT ACC 86350



NEG 74149 X100

Accession 86349

Registered by
Dr Wm. C Black
Denver, Colorado

SYNOVIOMA OF BURSA

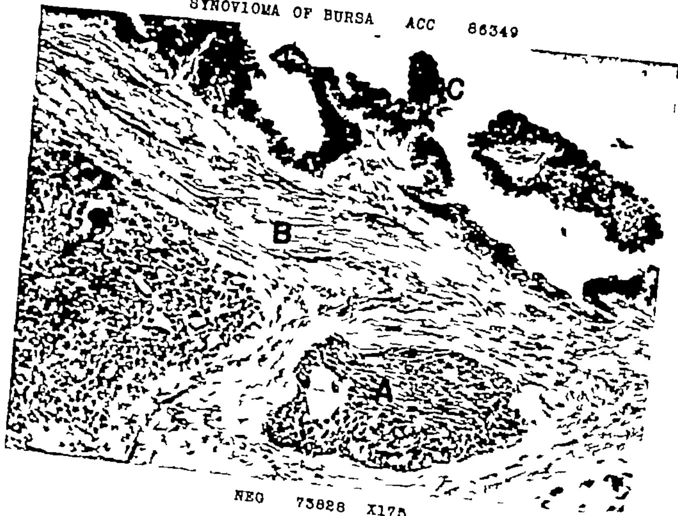
CLINICAL NOTE: The patient was a white man, thirty-six years of age, a railroad machinist Three years before surgical removal of the tumor, he received a crushing injury to the soft tissues between the thumb and forefinger of the right hand Following this injury a painless subcutaneous mass appeared on the palmar aspect of the web of the thumb The growth slowly increased in size and in time began to interfere with the use of the hand Surgical removal of the tumor was readily accomplished It was found to be encapsulated, and was not connected with the joint There was no recurrence after six months

PATHOLOGY: The specimen was received after fixation in 10 per cent formalin It is a firm, spheroidal mass measuring 2 5 cm. in diameter, enclosed in a thin fibrous capsule It cuts readily and is relatively inelastic as compared to fibrous tissue The surfaces are solid, grey-white, with a few small scattered brownish areas

Microscopically, the tumor is composed, for the most part, of fusiform-like cells that vary greatly in size and shape In general, the mass is made up of many small solid groups of concentrically arranged cells (A), surrounded by a thready blue-staining vacuolated mucoid substance and partly separated by trabeculae of incompletely hyalinized fibrous stroma (B) In some areas they grow in the form of villi (C) In a few areas the cells enclose alveolar spaces, and in others there are large solid masses of cells without concentric arrangement At the borders of the solid cell groups many tumor cells lie free in the mucoid substance Frequently these isolated cells are distended by an intracytoplasmic accumulation of hyaline pink-staining material that displaces the nucleus In cells not containing this substance the nucleus is large, ovoid, and reticular, with one or two nucleoli The cytoplasm is scanty and slightly basophilic

Reference: Synovioma of the Hand William C Black, Am. Jour of Cancer 28: 481, 1936

Slide No 72


SYNOVIOMA OF BURSA ACC 86349
C
B
A
NEG 73828 X175

Accession 60261

Registered by
Dr L L Ashburn
National Institute of Health
Washington, D C

MYOSITIS OSSIFICANS

CLINICAL NOTE: Patient is a white male, age 17 years He fell in June 1938 and injured his left hand and wrist There was no fracture by X-ray The wrist became painful, red and tender three days following the accident He was hospitalized, his temperature was 101°, and there was a mass or swelling infiltrating the median nerves and tendons of the left wrist The tumor was removed on 20 July 1938

X-RAY: There is an area of increased density over the anterior surface of the lower end of the radius and ulna

PATHOLOGY: On microscopic examination the section is composed largely of bony trabeculae (A) surrounded by a loose fibrous connective tissue stroma (B) throughout which are scattered small endothelial lined blood spaces (C) At one edge of the section there is a small collection of voluntary muscle fibers

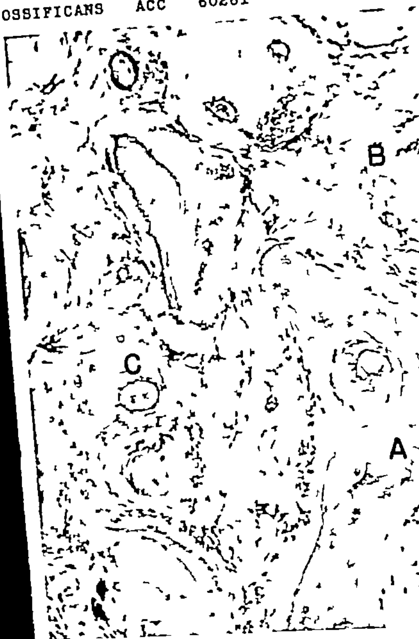
References:
Progressive muscular ossification (Progressive ossifying myositis) - A Progressive Anomaly of Osteogenesis Opie, E L Jour Med Res , 36: 267, 1917

Myositis Ossificans Traumatica, Bowers, R F Jour of Bone and Joint Surgery, 19: 215, 1937

Slide No 73

MYOSITIS OSSIFICANS ACC 60261





NEG 68187 NEG 73741 X125

Accession 52248

Registered by
Army Medical Museum
Washington, D C

ACUTE MYOSITIS

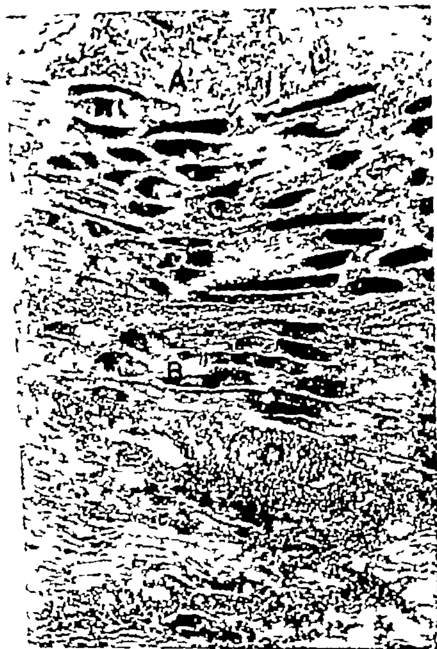
CLINICAL NOTE Patient is a white male 18 years of age He developed a cold and was admitted to the hospital on the following day with a high fever and chills Two days after admission he developed pain in the chest and rales were heard in the left lower lobe X-ray examination of the chest revealed consolidation of the lung The leucocyte count was 10,700 and gradually increased to 27,100 per cmm In spite of supportive therapy he died ten days after admission

PATHOLOGY: At necropsy there was an empyema of the left chest with massive atelectasis of the lung There was also an acute bacterial endocarditis of the mitral valve with multiple embolic abscesses of the various skeletal muscles

Microscopic examination of a section of skeletal muscle shows an extensive fibrinopurulent exudate (A) along one edge of the section, apparently the wall of an abscess, and a very definite extension of the inflammatory process between the muscle fibers (B), many of which have undergone degeneration

Slide No 74

ACUTE MYOSITIS ACC 52248



MEC 7?766 X100

Accession 58813

Registered by
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Washington, D C

TRICHINELLA SPIRALIS IN VOLUNTARY MUSCLE

CLINICAL NOTE A diagnosis of trichinosis was made and a piece of tissue was removed from the right biceps muscle for histologic examination

PATHOLOGY: On microscopic examination there are numerous pink staining chitinous areas that contain fragments of trichinae (A) There is also a fairly extensive inflammatory exudate (B) throughout the voluntary muscle Polymorphonuclear leucocytes predominate and eosinophiles are numerous

Slide No 75

TRICHINELLA SPIRALIS IN VOLUNTARY MUSCLE ACC 58813



NEG. 74478 X705

Accession 86570

Registered by
D Murray Angevine, M. D
Alfred I DuPont Institute
Wilmington, Del

PSEUDOHYPERTROPHIC MUSCULAR DYSTROPHY

CLINICAL NOTE: The patient is a 14 year old white boy A younger brother has a similar disease First symptoms were noted when the patient was 4 years of age: a clumsy gait and walking on his tip toes There was marked inflammation of the calves of both legs He has been unable to walk since 9 years of age On admission he could sit alone when placed in an upright position, but otherwise he could not sit up The lower extremities were held in flexion and external rotation The weight was 170 lbs The X-ray showed marked coxa valga of both legs The condition was gradually progressive A biopsy was done and a piece of muscle removed from the gastrocnemius muscle

PATHOLOGY: On gross examination the muscle (A) was almost entirely replaced by fat (B) The individual fibers were wider than normal The average transverse diameter of 100 fibers was about 65 micra Cross striations are present in only a few of the fibers A moderate number have a collagenous hyaline appearance The blood vessels are less numerous than one would expect from a comparable section

Reference: Diseases of the Muscles Histopathology of the Peripheral and Central Nervous System, Hassin, G B , Paul B Hoeber, 1940

Slide No 76

PSEUDOHYPERTROPHIC MUSCULAR DYSTROPHY ACC 86570



NEG 73812 X205

Accession 71614

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Army Medical Museum
Washington, D C

MYOSARCOMA OF THIGH

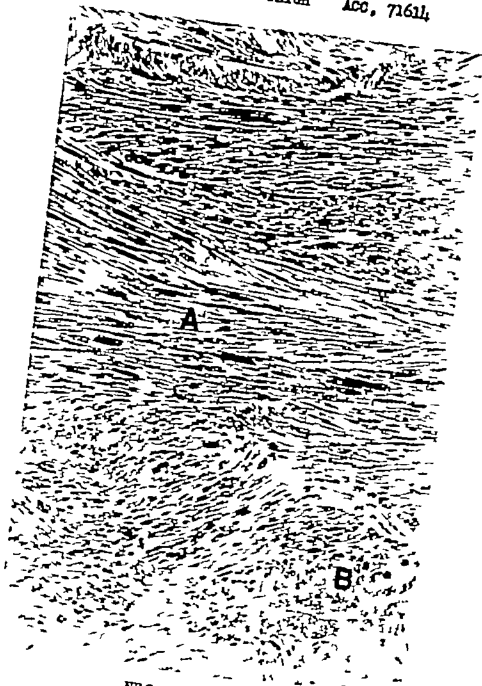
CLINICAL NOTE: The patient is a female with a small swelling on the leg which was diagnosed clinically as a possible fibrosarcoma Specimen measured 3 x 4 cm in diameter which had been excised with a wide margin of surrounding skin and subcutaneous tissue

PATHOLOGY: Microscopic examination reveals a dense, compact tumor underlying, but not connected with, normal epidermis There is a clear area between the skin and the tumor and subcutaneous tissue The tumor is composed of areas of tissue that resemble muscle They are arranged in whorls so that in some areas one sees longitudinal (A) fibrils, in other areas oblique, and in still others transverse sections (B) There is considerable variation in the size and shape of the nuclei as well as in the amount of eosinophilic cytoplasm in different fibers The tissue in general resembles smooth muscle The section is relatively avascular

Reference: Tumors of Muscle Geschickter, C F , Amer Jour of Cancer, 22: 378, 1934

Slide No 77

MYOSARCOMA OF THIGH ACC, 71614



NEG 73777 X125

Accession 78786

Registered by
Dr C R Lafferty
St Margaret's Hospital
Montgomery, Alabama

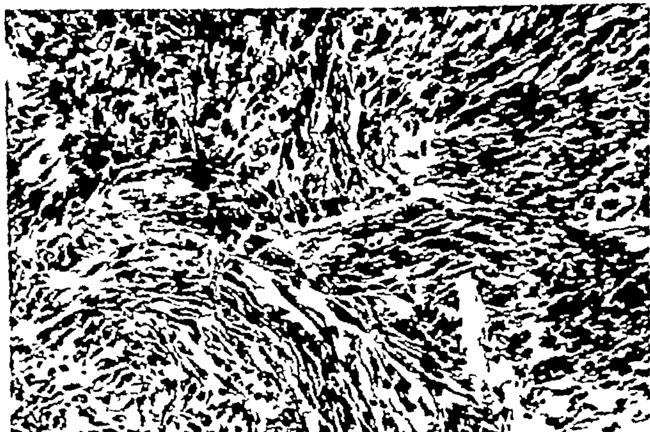
RHABDOMYOSARCOMA OF THE ARM

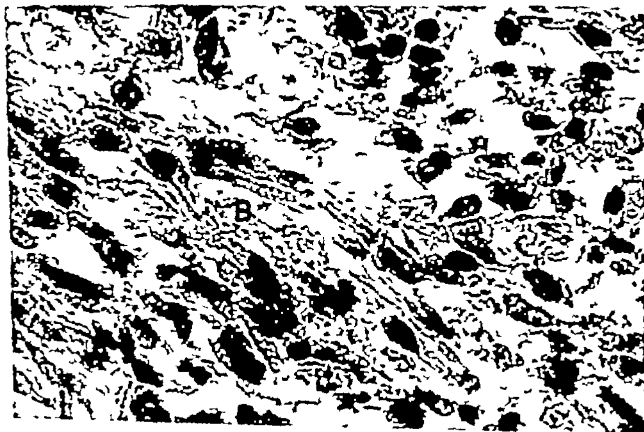
CLINICAL NOTE: The patient was 18 years of age No history available

PATHOLOGY: The specimen consists of a small, irregularly shaped piece of soft tissue On microscopic examination the tissue is very cellular with a tendency to form bundles so that one sees groups of cells cut longitudinally and others transversely There is a great variation in the size and shape of the cells However, many of them have the characteristics of muscle cells (A) The nuclei also vary in size, shape and staining quality Under a higher magnification one can distinguish cross striations (B), especially the sections stained with phosphotungstic-alum hematoxylin

Slide No 78

RHABDOMYOSARCOMA OF THE ARM ACC 78786





NEG 73797 X240 NEG 74142 X1000

Registered by
Army Medical Museum
Washington, D C

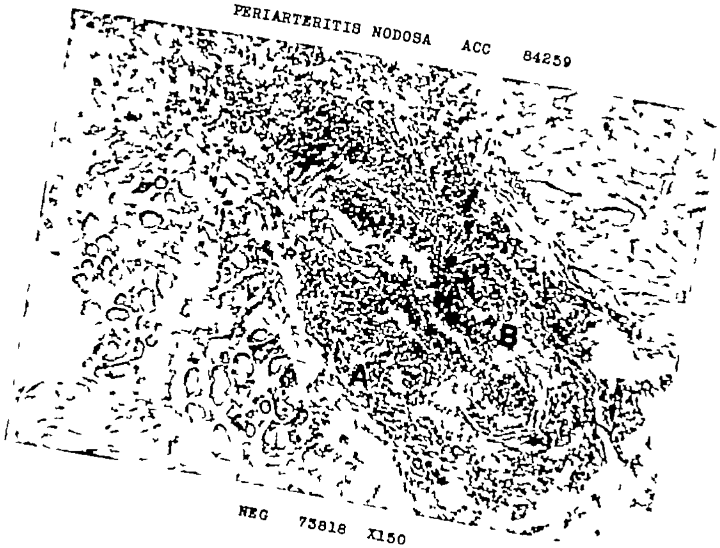
Accession 84259

PERIARTERITIS NODOSA

CLINICAL NOTE: The patient is a white man, 23 years of age, who was admitted to the hospital complaining of pain in the joints, loss of appetite, and jaundice of three days' duration The muscular soreness became pronounced and the pain was excruciating His WBC was 20,000 with 80% polyps The patient died three weeks after admission to the hospital

PATHOLOGY: An autopsy was performed The chief lesions were related to the vascular system and they occurred in the epicardium, kidney, intestines and skeletal muscles and to a lesser extent in other organs The lesion is one of perivascular inflammation (A) with moderate degeneration of the medium sized arteries (B) In a section of the skeletal muscle the inflammatory exudate beneath the intima is composed largely of polymorphonuclear leucocytes There is considerable hyaline degeneration of the wall of the vessels and at the periphery the inflammatory exudate contains a moderate number of polymorphonuclear leucocytes as well as considerable numbers of lymphocytes and monocytes

Slide No 79


PERIARTERITIS NODOSA ACC 84259
A
B
NEG 73818 X150

Registered by
Army Medical Museum
Washington, D C

Accession 73537

THROMBO ANGIITIS OBLITERANS
(Buerger's Disease)

CLINICAL NOTE: Patient is a white male, 45 years of age, who has had Buerger's disease for several years An amputation of the left leg was done following which an area of gangrene developed on the outer distal aspect of the thigh for which re-amputation was necessary See photograph

PATHOLOGY: A section was made through a large artery and vein There is considerable thickening of the vein wall and a moderate amount of lymphocytic infiltration of the adventitia The wall of the artery is most irregular and the elastica is irregularly arranged (A) The lumen (B) is greatly narrowed and there is extensive thickening of the subintimal tissue (C) and considerable degeneration of the outer coat There is an organized thrombosis of the lumen throughout which are scattered a few lymphocytes There are a few small endothelialized spaces that represent attempts at recanalization

Reference The Circulatory Disturbances of the Extremities: Including Gangrene, Vasomotor and Trophic Disturbances L Buerger, Philadelphia, Saunders 1924

Slide No 80

THROMBO ANGIITIS OBLITERANS ACC 73537



NEG 74141 NEG 73535 X205

Accession 78197

Registered by
Army Medical Museum
Washington, D C

CAVERNOUS ANGIOMA OF THIGH

CLINICAL NOTE: A white male, age 24 years, has had a swelling of the anteromedial surface of his right thigh for several years It has gradually increased in size Swelling disappeared when the leg and foot were elevated and it did not increase when a tourniquet was placed above or below On physical examination the mass was mainly in the course of the saphenous vein It was removed at operation

PATHOLOGY: Specimen consists of a mass of fatty tissue containing numerous blood vessels It is somewhat nodular Section shows the mass to be composed, for the most part, of blood vessels (A) These vessels contain a moderate amount of muscular tissue (B) in their wall However, many of them are not more than endothelial-lined spaces An occasional thrombus is seen, some of which are attached to the walls of the vessel

Slide No 81

CAVERNOUS ANGIOMA OF THIGH ACC 78197

A

B

NEG 73795 X200

Accession 56258

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Washington, D C

ANGIOENDOTHELIOMA

CLINICAL NOTE: A colored man, 38 years of age, twisted his left knee and hip in July 1937, and was away from work for three days Three months later he slipped again and twisted his hip and knee He was seen by a physician The pain became severe and it was necessary to stop work He was then admitted to the hospital with the diagnosis of giant cell sarcoma of the pelvic bone On physical examination there was a mass extending from the left iliac crest at the level of the anterior superior spine This mass was about the size of half an orange, was fixed and not tender The edges were rather indefinite

X-RAY: Practically all of the left iliac bone is absent and one sees only a few scattered cyst-like areas in this region The lesion involves the left sacro-iliac joint The left hip joint is apparently uninvolved

PATHOLOGY A small biopsy was removed from the region of the left ilium. On microscopic examination the section contained a few spicules of necrotic bone surrounded by osteoclasts surrounded by fibrous connective tissue and muscle Adjacent to this there is a fairly uniform structure composed of basophilic cells In some areas these cells grow in sheets, whereas in others they surround vascular spaces and are apparently attempting to form small blood vessels These cells have a tendency to grow in cords supported by a delicate connective tissue stroma The cells for the most part have a basophilic nucleus, about the size of that of a small lymphocyte, and they have a small amount of pink-staining cytoplasm. The cells are fairly uniform in size No mitotic figures are seen

Slide No 82

ANGIOENDOTHELIOMA ACC 56258

NEG 66547 NEG 66984 X850

Accession 77964

Registered by
Army Medical Museum
Washington, D C

NEUROMA FOLLOWING AMPUTATION

CLINICAL NOTE White male, 45 years of age Left leg had been amputated following a crushing injury and there was pain and tenderness in the stump for two years There were several painful masses along the course of the peroneal nerve Peroneal nerve was excised No relief was obtained until the sciatic nerve was injected

PATHOLOGY: About 9 cm. of peroneal nerve, a small nodule and a piece of normal nerve are shown in the photograph The microscopic section is composed of a fine pink-staining fibrous connective tissue stroma (A) that dissects or separates small localized areas of myelinated nerve tissue (B) The nerve fibers in some areas are cut in transverse section and in others obliquely or longitudinally The tissue is relatively avascular, and there are considerable numbers of lymphatics and few blood vessels throughout the section

Slide No 83

NEUROMA FOLLOWING AMPUTATION ACC 77964



NEG 74138 NEG 73792 X160

Accession 69151

Registered by
Army Medical Museum
Washington, D C

ACUTE ANTERIOR POLIOMYELITIS

CLINICAL NOTE The patient was a boy 11 years of age who had generalized abdominal pain followed by nausea and vomiting 3 days prior to admission to hospital Headache and insomnia developed, the neck became stiff and there was some pain in the throat on talking The temperature was elevated to 103° and the pulse rate rapid He was unable to retain food because of vomiting and there was considerable tenderness over the epigastrium There was weakness of one lower extremity and then the other, but no definite paralysis noted The legs and arms could be moved The abdominal reflexes were absent The neck remained stiff The spinal fluid contained 80 and later 130 cells per cu mm., the majority of which were lymphocytes Death occurred 7 days after the onset of symptoms

PATHOLOGY: At autopsy the mucosa of the small intestine was injected and Peyer's patches were prominent The mesenteric and retroperitoneal lymph nodes were enlarged The meninges over the brain and spinal cord were congested On microscopic examination of a transverse section through the cervical region the meninges (A) are edematous, congested and contain a few lymphocytes The blood vessels throughout are dilated (B) The most important alteration is in the anterior horns (C) Some of the large ganglion cells (D) have disappeared, others are swollen and stain a deep blue indicating degeneration In a few areas there is evidence of phagocytosis of these cells There is also a perivascular accumulation of lymphocytes (E) The lateral and dorsal roots are relatively uninvolved except for congestion

Slide No 84

ANTERIOR POLIOMYELITIS ACC 69151

A→

C

B

D

E→

NEG 74526 X14 NEG 74520 X175

Accession 82563

Registered by
Army Medical Museum
Washington, D C

NEUROFIBROMA OF FIBULA

CLINICAL NOTE: The patient is a white male, 36 years of age, who was struck on the left tibia with the limb of a tree 15 years ago There was a slowly enlarging cyst in this region until the present time This was well encapsulated and about 1½" in diameter The bone cyst was excised and curetted

X-RAY: There is a loculated cyst in the lower end of the fibula about which there is some swelling of the bone

PATHOLOGY: The tumor is greyish and encapsulated and bulged when cut across On microscopic examination the tissue was cellular, and interspersed with small areas of hemorrhage The bone was for the most part replaced by fibrous connective tissue-like stroma (A) However, in some areas this was arranged in a palisading fashion about lighter areas in such a way as to resemble a neurofibroma (B) In other areas the tissue was less compact and had more of the characteristics of a myxomatous tumor A moderate number of small vessels are present

Slide No 85

NEUROFIBROMA OF FIBULA ACC 82563





NEG 73551 NEG 73804 X100

Accession 82563

Registered by
Army Medical Museum
Washington, D C

NEUROFIBROMA OF FIBULA

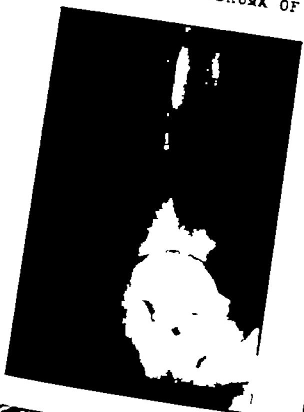
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Slide No 85

NEUROFIBROMA OF FIBULA ACC 82563





NEG 73551

NEG 73804 X100

Accession 60159

Registered by
Army Medical Museum
Washington, D C

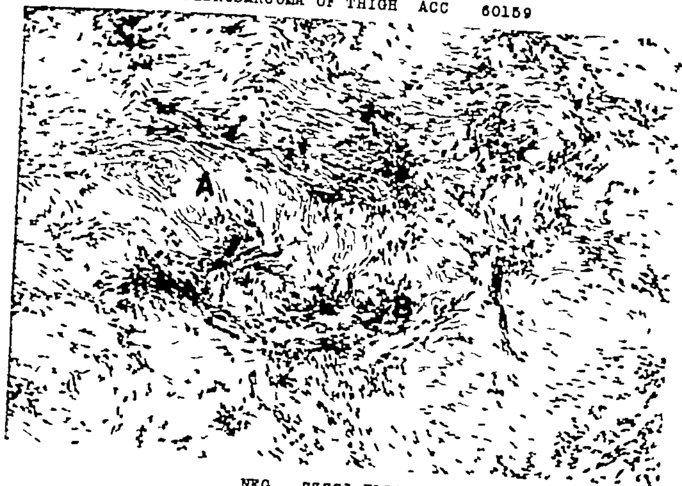
NEUROFIBROSARCOMA OF THIGH

CLINICAL NOTE Patient is a negro male, 23 years of age In June, while attempting to fix a truck, he was struck in the right groin by the axle About 4 months later he noticed a swelling in the right groin which increased in size He was hospitalized without treatment and then returned to duty Six months later he noted that the lump in the right groin started to enlarge and became painful He was admitted to the Walter Reed General Hospital, at which time physical examination was negative except for a tumor mass the size of a small grapefruit in the right groin. The mass was not attached to the underlying skin, was painful to touch and was fairly firm in consistency

PATHOLOGY: A biopsy was performed and the specimen consists of a mass of soft white tissue attached to a dense fibrous tissue Microscopic examination reveals irregular whorls (A) of dense eosinophilic staining material The more cellular areas (B) surround the fibrils with a definite tendency to palisading, which is a characteristic feature of a neurofibroma. A moderate amount of chronic inflammation is present in one part of the section.

Slide No 86

NEUROFIBROSARCOMA OF THIGH ACC 60159



NEG 73771 X150

Accession 62185

Registered by
Army Medical Museum
Washington, D C

CHORDOMA

CLINICAL NOTE: A colored man, 23 years of age, complained of a dull pain in the right kidney region, as well as weakness, loss of weight, and a productive cough with dyspnoea The sputum was occasionally streaked with blood There w's a sense of tightness in his chest On physical examination the inguinal glands were hard There was a generalized enlargement of the lymph nodes and the inguinal nodes were hard A firm mass was present in the right lower quadrant of the abdomen There was impaired resonance in both lungs

X-RAY: X-ray examinations revealed a large number of metastatic nodules in both lungs

PATHOLOGY: A large tumor that measured 20 x 12 x 6 cm. was found in the right side of the pelvis, extending up into the abdomen The tumor was entirely retroperitoneal, was firmly attached to the right iliac muscle and to the structures of the right abdominal wall by fibrous adhesions On dissection it was attached by a short pedicle to the anterior lateral surface of the right side of the sacrum which was eroded at the point of attachment The tumor was firm, grey-white, with yellow areas of degeneration There was bilateral hydrothorax and both lungs were studded with large numbers of nodules varying in size up to 4 cm across A section through the tumor revealed that it was arranged in nodules and separated by a fibrous stroma The cells have a tendency to grow in cords The cells are large with a considerable amount of eosinophilic cytoplasm, the nuclei are vesicular and in many instances pyknotic Although the tumor is relatively avascular, there are several thin-walled vessels in the central part of many of the tumor lobules

Reference: Chordoma of the Vertebral Column with 3 New Cases
Cappell, D F Jour Path and Bact 31: 797, 1928

Slide No 87

CHORDOMA ACC 62185

NEG 68515 X680 NEG 68516 X915

ACC 92622

Registered by
Lt Col Wallington Gray
Grant Medical College
Bombay, India

MYCETOMA, MADURA FOOT

CLINICAL NOTE: None This specimen of Madura foot was amputated

PATHOLOGY: The accompanying photograph shows the appearance of the foot When incised, the bones and soft tissues were found to be extensively destroyed by a suppurative process

Microscopically, the lesions consist of abscesses containing ray fungi These abscesses are more or less walled off by granulation tissue A characteristic lesion in the subcutaneous tissue of the foot is shown at low and high magnification

Slide No 88

MYCETOMA ACC 92622







NEG 39355 NEG 76567 X 100 NEG 75839 X 515

Accession 74810

Registered by
Washington Sanitarium
Takoma Park, Md

SQUAMOUS CELL CARCINOMA OF LEG

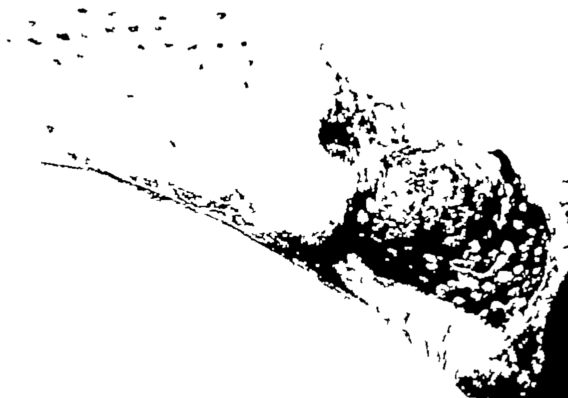
CLINICAL NOTE The patient is a white male, 55 years of age About twenty years ago he had an accident that caused loss of skin over the right knee There was a dense scar present About six months previously there was ulceration over the surface of the scar associated with extensive granulation tissue extending into the normal skin A piece of tissue was removed from the ulcer Four months later there was a recurrent growth of tissue at the edge of the chronic ulcer Microscopic examination of the tissue revealed an epidermoid carcinoma The right leg was amputated at the junction of the upper and middle third of the thigh

PATHOLOGY: A photograph of the leg shows the area of ulceration. A few pinch grafts are shown at the base of the ulcer The anterior surface of the lower leg shows numerous healed scars from which the grafts were taken On microscopic examination there is proliferation of epithelium with extensive keratinization in the form of "cancer pearls" (A) There is a considerable amount of chronic inflammation (B) between the epithelial buds

Reference: Epithelioma and the Chronic Varicose Ulcer L O Knox
Jour Amer Med Assoc 85: 1046, 1925

Slide No 89

SQUAMOUS CELL CARCINOMA OF LEG ACC 74810





NEG 72429

Accession 74810

Registered by
Washington Sanitarium
Takoma Park, Md.

SQUAMOUS CELL CARCINOMA OF LEG

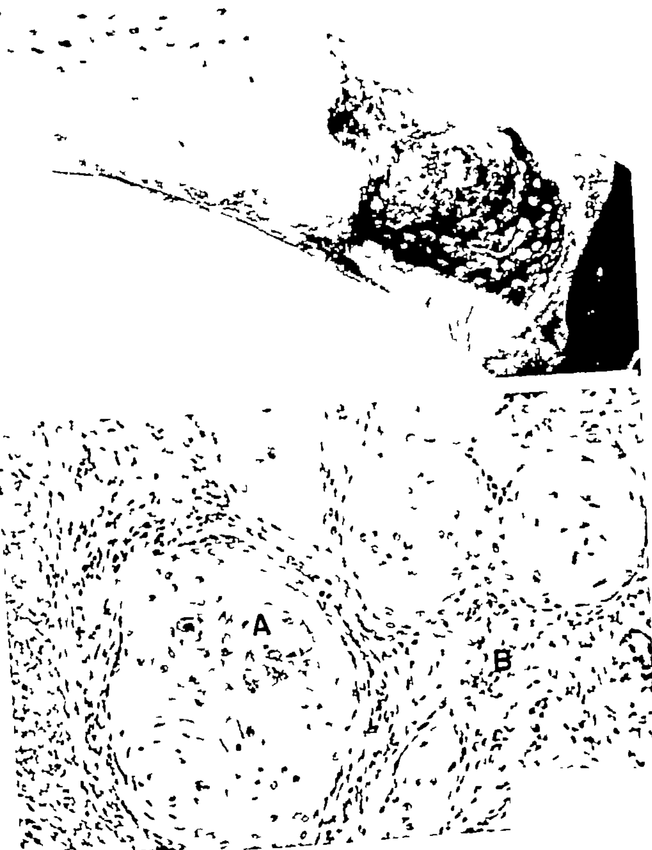
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Reference: Epithelioma and the Chronic Varicose Ulcer L C Knox
Jour Amer Med Assoc 85: 1046, 1925

Slide No 89

SQUAMOUS CELL CARCINOMA OF LEG ACC 74810



NEG 72429 NEG 73783 X160

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